Final Report

Illinois EPA

Interim Leachate Component Remedial Action Completion Report

Source Area 4

Southeast Rockford Groundwater Contamination Superfund Site

February 2011

CDM

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Section 1

Section 1 Introduction

Camp Dresser & McKee Inc. (CDM) received Work Order 4 from the Illinois Environmental Protection Agency (Illinois EPA), under Contract HWA-8308. Under this work order, CDM was authorized to complete an interim leachate component remedial action (RA) report for Source Area 4 (Area 4) of the Southeast Rockford Groundwater Contamination Superfund site (SERGC) located in Rockford, Illinois in accordance with the Operable Unit 3 (OU3, or Source Control Operable Unit) Record of Decision (ROD) (U.S. EPA 2002). An interim RA report is developed for groundwater remedial actions because of the long delay between construction of the treatment system and achievement of cleanup goals (U.S. EPA 2000).

1.1 Purpose and Organization

The purpose of this interim RA report is to provide information regarding the implementation of the leachate RA at Area 4. As described in the scope of work (SOW) for Area 4 Remedial Action Oversight (CDM 2006), an RA report is to be completed after the operational and functional (O&F) determination. The remedy was deemed O&F on October 6, 2010 after the final inspection had been completed the same day and after approximately one year of performance testing.

In accordance with the EPA guidance for NPL site close-out procedures (U.S. EPA 2000), this report is organized into the following sections:

Section 1 - Introduction: provides a Site description and Site history for Source Area 4.

Section 2 – Source Area 4 Description: provides a summary of the ROD requirements and remediation goals and other characteristics of the leachate remedial design for OU3 – Area 4.

Section 3 - Construction Activities: provides a summary of the leachate RA construction activities conducted.

Section 4 - Chronology of Events: provides a detailed chronology of major events for OU3 – Area 4, starting with the signing of the ROD up to present day.

Section 5 - Performance Standards and Construction Quality Control: provides a comparison of analytical sampling data to the remedial action objectives (RAOs), a description of sampling strategy and rational, and an assessment of data quality.

Section 6 - Final Inspections and Certifications: provides a summary of Site inspections and certifications including the O&F determination.

Section 7 - Groundwater Management Zone Monitoring Plan Activities: provides a description of activities to be completed in accordance with the applicable approved Quality Assurance Project Plans.

Section 8 - Summary of Project Costs: provides a summary of project costs associated with the leachate RA to date and a comparison of actual costs versus the original proposed costs.

Section 9 - Observations and Lessons Learned: provides a description of construction deficiencies and problems encountered and solutions related to the leachate RA implementation.

Section 10 - Source Area 4 Leachate RA Contact Information: provides a list of contact information for personnel involved in the Area 4 leachate RA and GMZ Monitoring, including EPA personnel, IEPA personnel, and RA contractor personnel.

1.2 Site Name, Location, and Description

The Southeast Rockford Groundwater Contamination Site is located in the southeast portion of Rockford, Illinois and covers an area approximately three miles long by two and one half miles wide and has three operable units (OUs):

- Operable Unit 1 (OU1): Drinking Water Operable Unit
- Operable Unit 2 (OU2): Groundwater Operable Unit
- Operable Unit 3 (OU3): Source Control Operable Unit

OU1 focused on providing local residents with a safe supply of drinking water, while OU2 addressed the area-wide groundwater contamination. A remedial investigation was conducted for OU2, which identified the primary source areas for groundwater contamination. These source areas include Areas 4, 7, 9/10, and 11. The contaminant plume in the groundwater with total chlorinated VOC concentrations above 10 parts per billion (ppb) defines the boundaries of the Southeast Rockford Superfund Site, as defined by the OU2 ROD (EPA 1995). The extent of the Southeast Rockford Groundwater Contamination Site is shown in **Figure 1-1**.

OU3 began as a state-lead action in May 1996 to select remedies for each of the source areas. Additional investigations were conducted for OU3 to determine the best course of action to clean up the source areas. The ROD for OU3 (EPA 2002) contains the actions, alternatives and preferred options for remediation of the source area contamination. The RA discussed in this report was implemented to remediate the groundwater contamination at source Area 4 in accordance with the OU3 ROD.

Source Area 4 for OU3 is located in southeast portion of Rockford, Illinois, within a mixed industrial, commercial, and residential area. Source Area 4 is specifically located to the south of Harrison Avenue at 2360 Marshall Street. This location consists of a building and a parking lot that formerly housed the Swebco Manufacturing, Inc. machine shop. Presently, the building is used as a wood pallet manufacturing and refurbishing operation. A residential trailer park (Barrett's) is located adjacent to Area 4 to the northeast. The location of Source Area 4 is shown on **Figure 1-2**.

1.3 Site History

In 1981, the City of Rockford discovered groundwater contamination at the property that became the Southeast Rockford Superfund Site. From 1981 to 1997, the Illinois EPA and the Illinois Department of Public Health (IDPH) performed investigations at the site that revealed that VOCs were present in the groundwater, soil, and soil gas. During this and subsequent investigations, numerous contaminants of concern (COC) were identified including 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-trichloroethane (1,1,2-TCA), trichloroethylene (TCE), tetrachloroethene (PCE), and carbon tetrachloride (carbon tet).

Historical activities at the Site by Swebco Manufacturing, Inc. resulted in spills, leaks, and/or direct discharges of chemicals at the former loading dock area and other areas. Chlorinated solvents are the principle contaminants present at the Site. Contaminants were released to the environment from storage tanks or improper disposal practices. Soil contamination, including visible staining and free product, exists from approximately 12 to 37 feet below ground surface (bgs) under the southern portion of the building and from 25 to 37 feet bgs in the northern portion of the parking lot area, and from just below the surface to 37 feet bgs in the former loading dock area where waste was thought to have been placed on the ground. Groundwater samples collected from the aquifer in the overburden soil revealed that chlorinated solvent contamination was present in the groundwater. Groundwater is encountered at approximately 30 feet bgs.

The Site was proposed for listing on the NPL in the Federal Register on June 24, 1988, and was formally added to the NPL on March 31, 1989 as a state-lead, federally funded Superfund site. The Record of Decision (ROD) for OU3 of the Site was signed by the Illinois EPA Director on May 8, 2002 and by the United States Environmental Protection Agency (U.S. EPA) Superfund Division Director on June 11, 2002. The Southeast Rockford Groundwater Contamination Superfund Site is identified by the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number of ILD981000417.

1.4 Regulatory Enforcement Activities

Since the development of the 1995 ROD, there have been two major enforcement agreements developed between the U. S. EPA, Illinois EPA and parties associated with the Southeast Rockford site. The first of these was a consent decree entered by the federal district court in Rockford in April 1998. This decree required the City of Rockford to install water mains and services within the public right-of-way, provide needed connections to homes and businesses, supplement the previously existing groundwater well-monitoring network with new wells, and commence a long- term well- network sampling and analytical program. This work has entered the monitoring phase. Over 9,200 feet of new water mains have been installed, and an additional 262 individual water service connections have been made. A total of nine new groundwater monitoring wells were installed, with several of these located near the Rock River. The consent decree also required the payment of up to $200,000 by the City of Rockford to the State of Illinois and federal government, for future oversight costs.

Several subsequent consent decrees were entered into with various potentially responsible parties (PRP), some of which were source area specific.

1.5 Investigation Activities and Remedial Actions

This section presents a brief summary of previous investigation activities at Area 4, significant findings of the RI, FS and pre-RA characterization activities, as well as previous remedial actions conducted.

1.5.1 Historical Investigations

The Phase I Remedial Investigation for the Southeast Rockford Groundwater Contamination Site was conducted from May to October of 1991 and consisted primarily of a site-wide soil gas survey, monitoring well installation and groundwater sampling and analysis. Within Area 4, ten soil gas samples were collected and down gradient monitoring wells were sampled. The results from the Phase I RI sampling indicated that elevated levels of TCA, PCE and TCE were present in the subsurface soils and in groundwater. Based on these results, the Phase II RI activities focused on finding the source areas of contamination within Area 4.

The Phase II activities were conducted from January 1993 to January 1994 and included additional soil gas sampling, installation and sampling of six soil borings and collection of two surficial soil samples. The Phase II results indicated that high concentrations of VOCs, primarily TCA, were present in the subsurface at depths ranging from 8 feet bgs to approximately 30 feet bgs. The source of this contamination was determined to be an abandoned manufacturing plant. The Phase II site-wide groundwater investigation conducted concurrently also indicated the same contaminant mix down gradient, confirming that the subsurface in Area 4 was impacting site-wide groundwater. In December 1993, residential air sampling was conducted in Area 4 to determine if the soil and groundwater contamination was affecting indoor air quality in homes near the source. The VOCs detected in the indoor air samples were consistent with those detected in the soil gas but were not found to be present at levels above health-based guidelines. Additional indoor air sampling was conducted in Area 4 in July 2003 and evaluated using the more recently developed soil vapor intrusion modeling guidelines. This indoor air evaluation indicated that the migration pathways are generally inadequate or incomplete and do not result in indoor air concentrations at levels that present an unacceptable health risk.

1.5.2 Remedial Investigation and Feasibility Study

The Remedial Investigation Report for the site-wide groundwater investigation and source area identification was completed by CDM (CDM 1995) and resulted in the signing of the OU2 ROD which required additional extension of the City of Rockford municipal water system and selected natural attenuation, long-term groundwater monitoring and source control measures as the remedy to restore the contaminated aquifer. In 2000 the SCOU RI and Focused Feasibility Study (FFS) reports were completed.

The SCOU FFS addressed contaminated soils, NAPL (non-aqueous phase liquid) and leachate considered to be principal threat wastes and the primary causes of groundwater contamination at the four primary source areas. Alternatives developed in the SCOU FFS were separated into soil and leachate alternatives. In order to simplify the OU 3 ROD, technologies intended to contain and/or treat contaminated groundwater in the immediate vicinity of the four primary source areas were considered leachate alternatives.

1.5.3 Pre-Design Activities and Pilot Testing

In order to fill data gaps identified in the SCOU RI/FFS prior to completion of the remedial design, additional pre-design field studies were performed at Area 4. In March 2004, five subsurface soil samples were collected from beneath the existing manufacturing building, in the former loading dock area and in the parking lot. Free product was determined to be present beneath the southern portion of the building and in the shallow soils in the former loading dock area. At all locations significant contamination or free product extended down to just below the water table at approximately 30 feet bgs.

An additional phase of pre-design field studies was deemed necessary to fully evaluate the extent of the free product in the shallow soils in the loading dock area and to determine the horizontal and vertical extent of contaminated vadose zone soils and the site related impacts to groundwater at and below the water table. This phase of pre-design activities was conducted from August 2005 through December 2005. The results of the sampling in the loading dock area were used to design an interim soil removal. The subsurface soil sampling indicated that the secondary source of contamination at the site has migrated along the water table/smear zone interval in the northwest direction from the former loading dock area. Outside of the former loading dock area, no VOC contamination was detected in soils above the water table/smear zone at concentrations greater than the remediation goals (RGs). The results of the groundwater sampling indicate the VOC contamination is typically highest in shallow groundwater. Contaminant concentrations rapidly decrease below the smear zone interval but are shown to be migrating off-site in the down gradient direction at concentrations above the RGs.

In July and August 2006, aquifer testing was conducted at Area 4 to determine the hydrogeologic properties of the aquifer determine treatment system requirements for use in preparation of the final remedial design (RD) for the leachate containment system. The aquifer testing was originally planned to be part of the 2005 pre-design investigation activities described above; however, the property owner of Area 4 rescinded access.

As part of this pilot test, three groundwater extraction wells were installed down gradient of Area 4 in the Marshall Street right of way (ROW) to be used for the aquifer testing and the final groundwater extraction system. The extraction wells were installed in the Marshall Street because access to Area 4 had not been restored. The results of the aquifer testing were evaluated using software designed to analyze pump test data and these results were incorporated into the regional groundwater model developed by CDM for the Groundwater RI. The model was updated and refined based on the data collected during the Area 4 aquifer testing and then the model was used to simulate and evaluate various pumping scenarios for the remedial design. The remedial pumping simulations indicated that pumping 45 to 60 gpm, depending on the well configuration, was sufficient to provide capture of the estimated extent of the 1,1,1-TCA plume at Area 4.

Groundwater sampling was also conducted as part of the pilot testing prior to the pump test and after the pump test to further delineate the 1,1,1-TCA contamination plume and to see the effects of the pump test on contaminant concentrations. The results of the pre- and post-pump test showed a significant decrease in the concentration of the Area 4 target VOCs 1,1,1-TCA, 1,1-DCA, and TCE in the immediate vicinity of the pump test pumping well, EW-2. Based on the 2006 data, the revised 1,1,1-TCA plume emanating from the loading dock at Area 4 widens to the south as compared to the plum delineated in the 2005 investigation. This may be due to variation in groundwater flow direction.

1.5.4 Previous Remedial Actions

An interim soil removal was conducted September 13th, 2005 in the 20 by 50 foot area of the former loading dock. Soils were excavated to a depth of approximately 4 feet bgs and disposed off-site as non-hazardous waste. The excavation was lined and backfilled with clean fill.

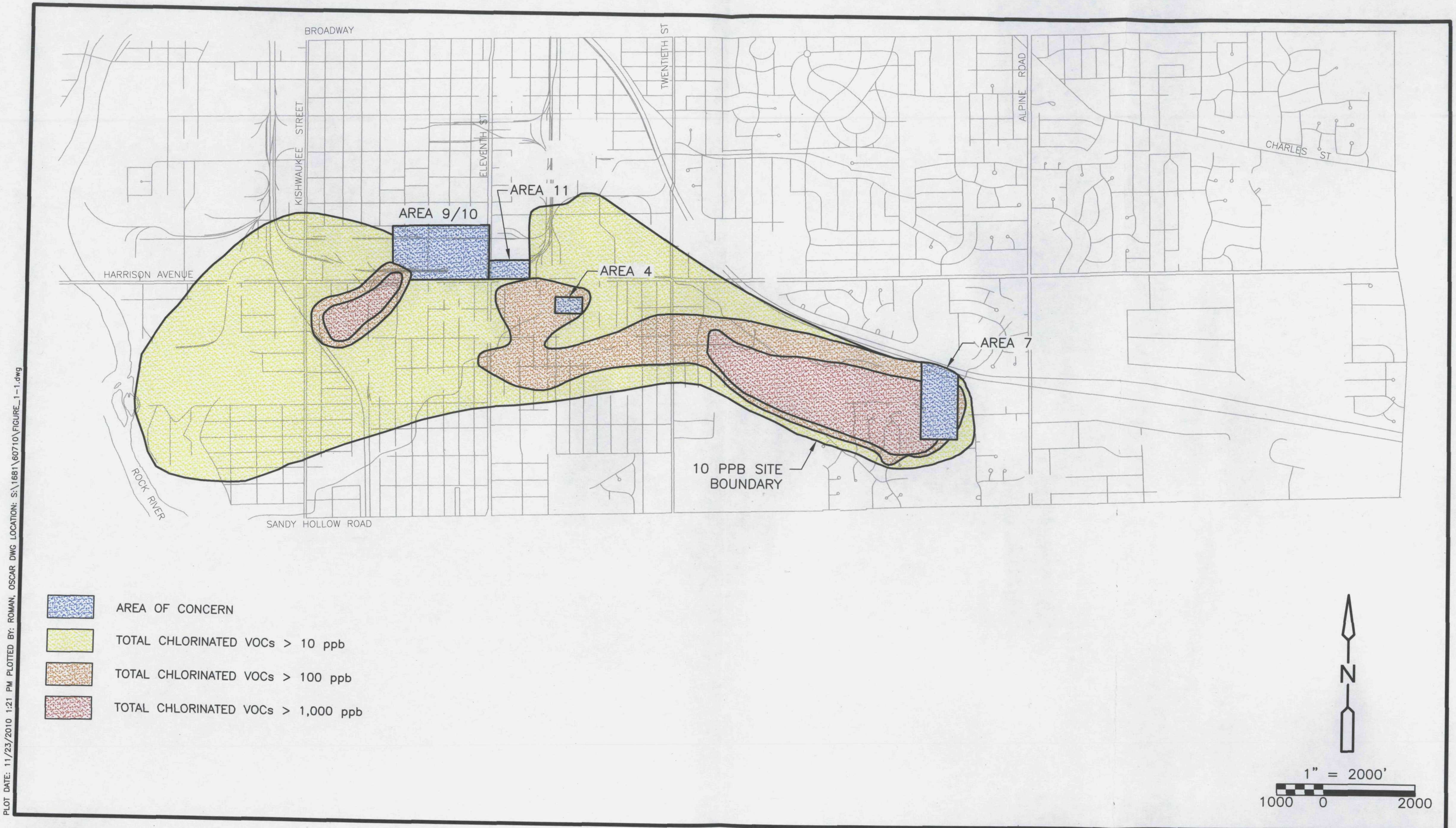

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Figure 1-1
Southeast Rockford Groundwater Contamination Superfund Site
Rockford, IL

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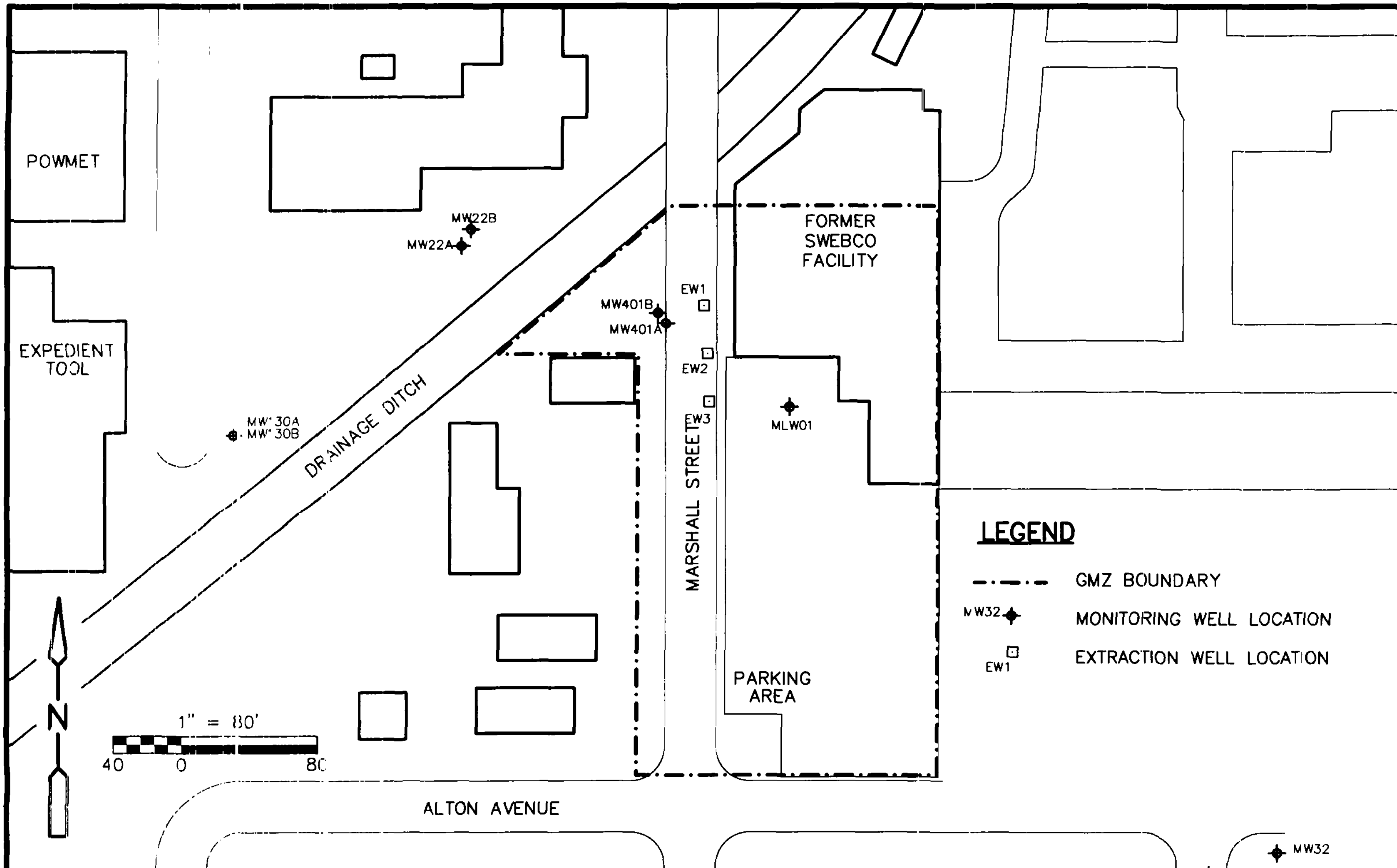


SOUTHEAST ROCKFORD GROUNDWATER CONTAMINATION SUPERFUND SITE
SOURCE CONTROL OPERABLE UNIT
ROCKFORD, ILLINOIS

CDM

SOURCE AREA 4 LAYOUT

Figure No. 1-2

Section 2

Section 2
Source Area 4 Description

This section presents background information on the Site including the following:

- A summary of requirements specified in the OU3 ROD (EPA 2002) including information on cleanup goals, institutional controls (ICs), monitoring requirements, operation and maintenance requirements, and other parameters applicable to the design, construction, operation, and performance of the RA.
- Additional information regarding the basis for determining cleanup goals for the Site, including planned future land use and a summary of the remedial design, including any significant regulatory or technical considerations or events occurring during the preparation of the RD.

2.1 ROD Requirements and Design Criteria

This section describes remedial action objectives (RAOs) and leachate cleanup goals, and a description of the selected remedy for Source Area 4 leachate.

Remedy selection was based upon the nature and extent of contamination, as well as consideration of the types of and uses of the properties in each area. The remedies described in the OU3 ROD were selected to accomplish the following results: (1) stop on-going contamination of the groundwater, thus protecting the water resources for future generations; (2) ensure that VOCs in soil gas do not move into the basements of nearby residences; (3) protect people from ingestion of contaminated groundwater; (4) reduce the risk of direct contact with contaminated soil or free product beneath the ground surface; and (5) assure the project is in compliance with the Operable Unit Two ROD provisions that required controlling sources of groundwater contamination.

Source Control Alternatives developed within the OU3 FFS and discussed in the ROD were separated into soil and leachate alternatives. In some cases, technologies designed to remediate soil, NAPL and leachate contamination are either not sufficient to protect human health and the environment, or they are not practical solutions. In these cases, technologies were considered to contain, rather than treat the resulting groundwater contamination. In order to simplify the ROD, technologies intended to contain contaminated groundwater in the immediate vicinity of the four primary source areas are considered leachate alternatives.

2.1.1 Remedial Action Objectives

Based on remedial investigations and a site-specific risk assessment, remedial action objectives (RAOs) were developed. The following Source Area 4 RAOs provide a general description of what the leachate remedial action is intended to accomplish:

- Prevent the public from ingestion of soil, and direct contact with soil containing contamination in excess of state or federal standards or that poses a threat to human health

- Prevent the public from inhalation of airborne contaminants in excess of State or federal standards or that pose a threat to human health; and
- Prevent the further migration of contamination from Source Area 4 that would result in degradation of site-wide groundwater or surface water to levels in excess of State or federal standards, or that pose a threat to human health or the environment.

A number of potential remedial action alternatives for Source Area 4 were developed and evaluated based on RAOs, remediation goals and comparative evaluation criteria. The detailed comparative analysis of Source Area 4 remedial alternatives is discussed in detail in the OU3 ROD. Based on the comparative analysis, the remedy selected for Area 4 includes institutional controls, soil excavation with on-site low temperature thermal desorption, and hydraulic containment and treatment of leachate. This Interim RA Completion Report pertains only to the leachate control system portion of the remedial action.

2.1.2 Selected Remedy and Cleanup Goals

The RA implemented at Area 4 will be conducted in two separate stages. The first stage, which is the subject of this Interim RA Completion Report, addresses leachate by controlling the off-site migration of chlorinated solvent contamination in groundwater from the source area. Leachate extraction wells have been installed downgradient of the main soil source areas for long-term hydraulic containment of leachate. Extracted leachate is pumped to a leachate treatment system consisting of an oil/water separator, air stripper and liquid phase carbon for treatment of leachate and vapor phase carbon units for treatment of the vapor effluent from the system. Subsequently, effluent water is discharged to the concrete-lined drainage ditch immediately north of the treatment system.

The second stage of the RA will address contaminated soil at the site. The OU3 ROD calls for the contaminated soil to be excavated and treated through on-site thermal treatment via a low temperature thermal desorption (LTTD) unit. Based on the results of the additional pre-design soil sampling it was determined that the soil remedy selected would require substantially more cost and effort than originally planned to achieve the remedial action objectives for soils. Additional sampling will be conducted to determine if a ROD modification is necessary and the data necessary for the modification itself. The RD/RA for the "soil" portion of Source Area 4 will be prepared and conducted at a later date.

Subsequent to the approval of the OU3 ROD and as part of the pre-design activities, effluent discharge limits were also established for this project that apply to any waters discharged into the stormwater drainage system. Additionally, the groundwater must meet the groundwater remediation goals at the point it leaves the Groundwater Management Zone (GMZ). All groundwater clean-up standards for the Site are subject to Class I Groundwater Standards pursuant to 35 Ill. Adm. Code Part 620.410. The effluent discharge limits were based on the most recent information for the parameters of concern and the chronic aquatic toxicity criteria were selected because the discharge point is a storm ditch with low flow. During the pre-design activities for Area 4, carbon tetrachloride was identified as an additional contaminant of concern requiring remediation objectives not included in the 2002 OU3 ROD. In a letter from Illinois EPA project manager Thomas Williams to the USEPA project manager Russ Hart, dated July 22, 2004, both groundwater and discharge limits were specified to be consistent with the remediation objectives provided in the OU3 ROD.

The table below provides these goals and requirements that will be the criteria against which analytical data collected for cleanup and discharge verification will be compared.

Table 2-1.
Remedial Goals and Discharge Limits

Compound	Groundwater Remediation Goal	Effluent Discharge Requirement
1,1,1-TCA	200	390
1,1,2-TCA	5	4,400
1,1-DCE	7	240
Carbon Tet	5	280
PCE	5	150
TCE	5	940

Note: All concentrations in microgram per liter.

2.2 Remedial Design Summary

The leachate selected remedy for Area 4 is summarized in this section. In order to provide a site-specific framework for the design, terms including groundwater management zone and leachate source control are provided.

2.2.1 Site-Specific Terms

2.2.1.1 Groundwater Management Zones (GMZ)

Pursuant to 35 Ill. Adm. Code 620.250, Illinois EPA has defined a Groundwater Management Zone (GMZ) for Area 4. As defined by Illinois EPA regulations, "a GMZ may be established as a three dimensional region containing groundwater being managed to mitigate impairment caused by the release of contaminants from a site." GMZs are used and established for sites undergoing remediation that is approved by the Illinois EPA. **Figure 2-1** shows the boundary of the GMZ.

Volume 1, Section 7.1 of the FFS states, "Groundwater that lies beyond the GMZ of each source is considered part of the site-wide groundwater." During the time needed for remediation of the source areas, groundwater that exceeds the Class I Groundwater Quality Standards will exist below the entire area. The GMZ boundary will act as a location for compliance measurement.

2.2.1.2 Leachate Source Control

Leachate source control includes contaminated leachate in the shallow water-bearing zone. Leachate is assumed to be contamination that originated from the soil source areas and has migrated to the unconsolidated aquifer within the designated source areas. Contaminated source leachate is defined in the FFS and hereafter as shallow groundwater located inside each source area GMZ. Groundwater located outside the potential GMZ of the source areas was evaluated as part of management of migration of site-wide groundwater, and is not addressed as part of the source area remedy.

The groundwater modeling conducted following the pre-design aquifer testing activities indicated that either one 60 gpm extraction well or three 20 gpm extraction wells would be the most efficient for capturing the plume. The three-well configuration was selected due to maintenance and malfunction considerations. An air-stripping unit then treats the extracted leachate. The treated effluent is discharged on-site to an adjacent storm water ditch. Effluent will be monitored quarterly for VOCs to confirm that the leachate is treated to acceptable levels. Vapors stripped from the leachate in the air-stripping unit will be directed to an on-site granular activated carbon (GAC) unit. The effluent vapor stream from the vapor phase carbon unit will be monitored monthly to determine that the VOC discharge rate remains below 8 pounds per hour. Institutional controls will be placed on groundwater usage within the GMZ, monitoring wells will be installed and a groundwater- and leachate-monitoring program will be implemented.

Originally, the entire Area 4 leachate extraction and treatment system (i.e., the groundwater extraction wells and treatment train described above) were to be located on the actual Area 4 property. However, difficulties with obtaining property access caused Illinois EPA to relocate all system components to publically-owned ROWs. Further, because the proposed treatment system location on the ROW was in close proximity to several underground utilities, the treatment system was designed as a "mobile" unit that could be quickly disconnected and moved if emergency repairs to the underground utilities were necessary.

Section 3

Section 3
Construction Activities

This section provides a summary description of the activities undertaken to construct and implement the Southeast Rockford Area 4 leachate RA including mobilization and site preparation, construction and installation of all vaults, pipes, connections, and appurtenances related to the pumping and transfer of groundwater to the treatment unit, construction and installation of groundwater treatment unit, and startup and testing of the groundwater treatment unit.

3.1 Mobilization and Site Preparation

Prior to commencement of major construction activities at the Site, several activities were conducted, including clearing and grubbing, installation of orange construction fence, installation of silt fence and other erosion control features, installation of the project office trailer, utility locating, and obtaining permits.

3.1.1 Site Preparation

Clearing and grubbing activities were conducted at the proposed treatment unit building location at the dead end of Sewell Street on the south side of the concrete drainage ditch. Trees and bushes were removed from the area and disposed off site.

Portions of the work area limit were defined using orange construction fencing prior to commencement of work. The fencing was placed on all work area limit boundaries along private property and opposite the silt fence (Section 3.1.2 below). Fencing was installed using steel T-posts as support and securing the fence with zip ties.

3.1.2 Erosion and Sedimentation Controls

Silt fence was installed along the south side of the concrete drainage ditch at the top of slope. The silt fence was originally installed at the top of the ditch along the entire limit of work, except within an area of dense brush and debris that could not be feasibly removed during site mobilization. Upon implementation of work along the drainage ditch, the brush and debris in this area were removed by heavy equipment excavation. At this time silt fence was installed in the area.

Sediment filter traps were installed in the two stormwater drains on the north end of Marshall Street within the limit of work. The traps consisted of a metal frame sized to fit into the storm drain and geotextile filter fabric secured within the metal frame for sediment filtration. The stormwater drain steel grates were placed over top of the sediment traps for the duration of the work. A similar sediment filter trap was installed at the storm drain at the dead end of Sewell Street on the south side of the concrete drainage ditch (next to the leachate treatment unit).

3.1.3 Utility Location and Modification

Prior to commencing construction activities, Bodine Environmental Services Inc. (RA Contractor) contacted the Joint Utility Location Information for Excavators (JULIE) one call entity for marking subsurface utilities throughout the proposed work area. During the remedial design process, utilities had been located and included on the design contract drawings. The onsite utility locate verified the location of utilities included on the design drawings and also added locations of additional underground utilities not marked on the design drawings. Upon marking of existing utilities, plans were made for placement of the leachate treatment unit building at the dead end of Sewell Street on the south side of the concrete drainage ditch. However, the City of Rockford requested that the treatment unit building not be placed over existing utilities, in particular, the existing sewer and gas pipelines located in the proposed treatment unit area.

In order meet the City of Rockford's request, Nicor Gas Inc. was contracted by the City of Rockford to modify the location of the existing gas line in conjunction with storm water improvements on Sewell being performed by the City. Starting on September 1, 2009, Nicor Gas Inc. mobilized onsite to install a new gas line parallel with Sewell Street. A directional drilling rig was set up on the north side of the concrete drainage ditch near the Site office trailer. A directional borehole was installed along a north-south trend beneath the concrete drainage ditch, at a distance of approximately 10 feet to the east of the existing gas line. Once the borehole was completed, the new pipeline was pulled through the borehole and connected to the existing gas line. Excavations were conducted on both ends of the new gas line location to cut the existing pipeline and make the required connections to the new pipeline. The old gas line was abandoned in place. The movement of the gas line to the east allowed enough room for the leachate treatment unit building to be placed as planned, and to avoid placement over the existing city sewer pipeline. Upon completion of the gas line re-alignment work, the old and new gas lines were marked with paint and flagging. Near the proposed treatment unit area, the new gas line was reported to be a least 10 feet below ground surface, according to Nicor Gas site workers.

The gas line re-alignment was completed within an approximate one-week period. After backfilling of the trench on the north end (near the Site office trailer), Nicor abandoned the site without performing any site restoration such as seeding or placement of erosion control. As a result, erosion of backfill material occurred during several heavy rain events, and undermined asphalt at the dead end of Sewell Street.

3.1.4 Permits

Prior to commencing construction activities, the RA Contractor obtained a right-of-way permit to perform work on Marshall Street for a 3-week construction period between August 17, 2009 and September 5, 2009. Under the permit, the portion of Marshall Street within the work area limits was shutdown to through traffic. Road barricades were erected on the north and south sides of the closed street. For the duration of work, a road closed sign was posted at the north end of Marshall Street at the intersection with Harrison Avenue.

Work was completed on Marshall Street within the scheduled period of the permit and the road was reopened on September 4, 2009. However, the permit period was extended for two additional weeks to allow for work at the well valve vault. Extension of the construction permit on Marshall Street allowed the RA Contractor to partially or completely close down Marshall Street as needed to conduct work in a safe manner near the well valve vault. A copy of the Marshall Street permit is included in **Appendix A.**

A building permit was also obtained from the City of Rockford for installing the pre-fabricated leachate treatment unit building. The permit was issued by the City of Rockford on October 6, 2009. A copy of the building permit is included in **Appendix A.**

3.1.5 Temporary Facilities

A site office trailer was installed on the dead end of Sewell Street on the north side of the concrete drainage ditch. The office trailer was installed in accordance with the Contract Documents (i.e., RD drawings and specifications, and RA Contractor submittals). The trailer contained two locking external doors and two rooms with internal door, desk spaces, cabinet storage spaces, a drawing table, refrigerator, heater and air conditioner, drinking water supply, a fax/printer/copy machine, and electrical and telephone connection. A gravel pad was placed as a base for the office trailer. One single-occupant toilet unit was also present onsite next to the office trailer.

3.2 Marshall Street Excavation, Trenching, and Backfilling

Work on the closed down portion of Marshall Street was the first major phase of RA construction for Area 4. Commencement of this phase of work began on August 18, 2009 and was completed on September 3, 2009 with the placement of new asphalt within the excavation area. This phase of work included excavation of existing asphalt within the entire work area limit, trenching along the extraction wells and up to the well valve vault, pipe and electrical conduit installation, extraction well vault and well valve vault installation, backfilling and compaction, grading and resurfacing, placement of new asphalt pavement, and work area cleanup and seeding.

3.2.1 Asphalt Excavation

Excavation of existing asphalt on Marshall Street began on August 18, 2009. This work was conducted in order to access and connect piping to the groundwater extraction wells located on Marshall Street. All excavating and general contractor work was conducted by Packard Excavating, Inc., an RA Subcontractor. The Subcontractor used a track-mounted excavator (Volvo EC140B) and compact wheel loader (Case 95XT) to remove existing asphalt. Asphalt and a mix of gravel sub-base material were loaded onto trucks and disposed off site. The initial asphalt excavation work was completed within a one-day period.

All of the existing street asphalt was removed from within the original work area limit on Marshall Street, as defined on the Contract Drawings. An additional five to ten feet of asphalt excavation was conducted on the north and south sides of the work area. This additional excavation was completed at the RA Contractors discretion in order to complete the work safely and effectively, and did not affect contract scope, budget, or schedule.

3.2.2 Trenching and Well Valve Vault Placement

3.2.2.1 Well Valve Vault

The well valve vault is located on the west side of Marshall Street, on the north end of the work area limit. Pressure piping and electrical conduit from each of the three extraction wells enters the well valve vault on the east side. The well valve vault houses an electrical control panel and various equipment for operation of the pressure pipelines (e.g., flow meters, valves, manifold, and sample tap). The well valve vault serves as an access point for this equipment. This section describes the installation of the well valve vault structure. Further details on installation of mechanical and electrical components in the well valve vault are provided in Section 3.4.

Excavation of the hole for the well valve vault was completed on August 18, 2009 using the track-mounted excavator. Final grading of the well valve vault excavation floor was completed by hand on the following day, August 19, 2009. Following grading of the excavation floor, the pre-cast concrete well valve vault was set in place. The well valve vault was manufactured and delivered by Rockford Cement Products Co. A truck-mounted hydraulic crane was utilized to lift the well valve vault off the delivery truck and set it into the excavated hole. The well valve vault was lifted by the crane using the four rebar lifting hooks embedded into the pre-cast concrete vault walls. Additional information on construction and specifications for the well valve vault are provided in Section 3.4.

3.2.2.2 Trench Excavation

Excavation of the trench for process pipe and electrical conduit between the well valve vault and each extraction well was conducted initially on August 19, 2009 using the track mounted excavator. This work was completed after the installation of the well valve vault. The excavation was started at the east well valve vault wall and was continued easterly into Marshall Street. The trench was then curved gradually to run parallel with Marshall Street along the west side of each extraction well. All sides of each extraction well pipe were exposed using the excavator and also by hand as needed. The entire trench was dug at minimum 4 feet below the original road surface. The trench was sloped gradually down to the well valve vault, where the depth at the vault was approximately 5.5 feet below ground surface. Trench depths were checked by the RA Subcontractor using a survey station (tripod, laser level, level rod, and rod-mounted laser level detector).

3.2.3 Process Pipe and Electrical Conduit Installation

This section describes the installation of the process piping and electrical conduit between the extraction wells and the well valve vault.

3.2.3.1 Process Pipe and Fittings

Prior to construction activities, CDM, IEPA, and the RA Contractor agreed to use high density polyethylene (HDPE) pipe for process (pressure) pipe and containment pipe, rather than the polyvinyl chloride (PVC) pipe specified in the original Contract Documents. Two-inch HDPE pipe was installed as the process pipe and four inch HDPE pipe was installed as the containment pipe. All process piping had exterior insulation installed to protect against extreme temperature conditions. The pipe specifications are as follows: 2-inch and 4-inch iron pipe size (IPS) standard dimension ratio (SDR) 11.0; pressure class (PC) 160 (160 psi pressure rating); polyethylene (PE) 3408/3608 (material designation code). For the 4-inch pipe, DrisoPlex® brand pipe was delivered to the site in 40 foot lengths unbent (manufactured by Performance Pipe, a Division of Chevron Phillips Chemical Company LP). For the 2 inch pipe, two different brands of 500 foot coils were delivered to the site. The two brands used were DrisoPlex® brand, and JM Eagle™ brand. Both brands of pipe have the same engineering specifications and are considered to be equivalent as pressure pipe for the purposes of the remedial action.

Sections of 4 inch HDPE pipe were fused as needed using a McElroy Manufacturing Inc. PitBull No. 14 fusion machine. Fusion of 2-inch HDPE pipe was only conducted at the ends of each pipe run to attach the appropriate adapters. All fusion bonding of HDPE pipe was completed by a certified technician. Four inch HDPE pipe was laid first in the trench, followed by feeding the 2-inch HDPE through the 4-inch pipe with a pull string.

Connection of HDPE pipe to each extraction well was completed using a Merrill Manufacturing Company MCKS620 pitless adapter. The adapter type is a pressurized connection, which consists of internal (inside extraction well casing) and external (outside extraction well casing) components. The internal components of the pitless adapter consist of a stainless steel support bar and pull pipe attached to the brass pitless adapter body. The support bar was cut to the required length for the pitless adapter connection (minimum 4 feet below the top of PVC well casing). The pitless adapter body has an O-ring seal that sits flush against the inside of a 2-inch diameter hole drilled into the side of the 6 inch PVC well casing.

The external components of the pitless adapter consist of a brass discharge hub with O-ring seal on the inside and a 2-inch threaded female pipe connection on the outside. The O-ring seal sits flush against the outside of the 2-inch diameter hole drilled into the side of the 6 inch PVC well casing. The discharge hub (with bolt holes) is attached to the 6-inch PVC well casing using two stainless steel U-bolts with back straps and stainless steel nuts. Upon startup of the submersible pumps, positive pressure creates suction on both the internal and external O-rings, forming a water-tight seal around the 2-inch diameter hole in the PVC well casing.

A 2-inch brass to HPDE adapter was attached to the discharge hub of the pitless adapter connection. The 2-inch HPDE process pipe was then fused to the HDPE adapter extension. The 4-inch containment pipe was sealed around the discharge hub connection using a 4-inch to 2-inch rubber Furnco adapter. The Furnco adapter was secured in place around the 2-inch and 4-inch pipes with stainless steel hose clamps.

Each of the three 2-inch and 4-inch HDPE pipelines enter the well valve vault through holes in the east concrete wall, drilled to be approximately one inch greater diameter than the outside diameter of the 4-inch HDPE pipe. The process piping enters into the south room of the well valve vault. The 4-inch HDPE pipe is terminated (open draining) on the inside of the well valve vault. Link seals (Link-Seal® LS-300) were placed around each 4-inch HDPE pipe, which provides a water tight seal around the pipe.

3.2.3.2 Process Pipe Pressure Testing

Hydrostatic pressure testing with compressed nitrogen gas was completed on all three 2-inch HDPE pipelines coming from each extraction well into the well valve vault. The influent sides of the HDPE pipelines were temporarily detached from the pitless adapters and capped with a threaded steel cap to complete the testing. The effluent sides of the HDPE lines (in the well valve vault) were connected to a testing apparatus that consisted of the following with appropriate fittings (in said order): 1) 2- inch HDPE pipe flange adapter with reducer to 1-inch brass pipe, 2) 160 psi pressure regulator, 3) ball valve, and 4) gas hose quick connect adapter. Testing was performed in accordance with the specifications as indicated by the following observations:

- Each 2-inch pipeline was pressurized with compressed nitrogen gas up to approximately 150 psi (50% above operating pressure).
- The pipes remained pressurized for a period of up to one hour to monitor for leakage and any change in the pressure reading.
- Leaks were at first observed audibly and then later by spraying soapy water solution on the connections. A slight pressure drop was observed as a result of leaks on the 2-inch/4-inch HDPE flange connections.
- The testing apparatuses were subsequently removed, pipe dope was reapplied to connections, the connections were tightened, and the testing apparatuses were reattached to the pipeline.
- Re-testing was conducted near 150 psi for one hour and no leaks or change in pressure were observed. The testing was considered complete at this time.

3.2.3.3 Electrical Conduit

Prior to construction activities, CDM, IEPA, and the RA Contractor agreed to not use the concrete electrical raceway encasement as originally specified in the Contract

Documents. Rather, electrical conduit would be laid directly in the trench. The type of conduit used in the trench was Schedule 40 rigid PVC. Ten foot long sections were connected with PVC glue between the well valve vault and each extraction well. A total of nine PVC conduits enter into north room of the well valve vault through the east concrete wall. There are three conduits that terminate at each of the three extraction wells. At each extraction well end and at the well valve vault entrance, the PVC conduit was converted to galvanized steel conduit.

At the extraction wells, each of the three PVC conduits converts to galvanized steel with a 90° elbow. The galvanized steel conduits run parallel with each extraction well and each of the conduits connects to galvanized steel explosion proof junction boxes (Appleton GR-EFHC Series). For two of the three explosion proof junction boxes, conduit enters into the extraction well via a 1-inch hole drilled through the side of the PVC well casing. For the third explosion proof junction box, conduit enters into the extraction well through the top of the casing via a Turtle® Vermin watertight 6-inch diameter cap, supplied by Baker Manufacturing Company, LLC. The cap is constructed of a PVC base and acrylonitrile butadiene styrene (ABS) top. The PVC base was glued to the PVC well casing. The ABS top is removable and secures to the PVC base with four stainless steel bolts. An O-ring seal between the base and top make the cap a watertight seal.

At the well valve vault, each of the nine PVC conduits convert to galvanized steel just before entering the vault. Conduit enters the vault through holes in the concrete wall drilled to be approximately one inch greater diameter than the outside diameter of the 1-inch conduit. Link seals were placed around each of the galvanized conduits to form a water tight seal.

3.2.3.4 Backfill and Grading

After the connections were made on each extraction well, limestone gravel pipe bedding was poured along the entire trench bottom. The type of gravel used was a poorly graded limestone gravel, material code CM07. An aggregate gradation report for this material is provided in **Appendix B**. Although approved for use, the type of pipe bedding material used was different than the sand bedding originally specified in the Contract Documents. In addition, clay pipe trench dams were not considered necessary for the pipe backfill so they were not used as specified in the Contract Documents. These field order changes were agreed upon between CDM, IEPA, and the RA Contractor during implementation of the RA.

The slope of the HDPE pipe runs were checked with a survey station (tripod, laser level, level rod, and rod-mounted laser level detector) and bubble level. Slope was adjusted as needed by adding or removing limestone gravel beneath the pipes. Link seals were not yet installed at the well valve vault to allow for flexibility in the pipe grading work. The depth of gravel bedding beneath each pipe run ranged from 2 to 6 inches. After the pipe slopes were set, additional gravel was poured around all the pipes filling the complete width of the trench. Two inch thick foam board insulation was then placed over top of all the pipe runs, followed by an additional four inches (approximate) of limestone gravel on top of the foam board. Foam board was not required per the Contract Documents; however, the RA Contractor decided it would be an added safety benefit to prevent frost/freeze of piping.

The electrical conduit was installed on the additional limestone gravel bedding layer above the foam board insulation. The electrical conduit was graded to slope towards the well valve vault using a level. Once the electrical conduit grade was set, additional limestone gravel was placed over top of the conduit (approximately 3 to 4 inches). The remaining backfill above the piping and electrical conduit is described in Section 3.2.5 below.

3.2.4 Extraction Well Vault Installation

3.2.4.1 Installation

After backfill work was conducted over the process pipe and electrical conduit (described above), each extraction well vault was installed. Each extraction well vault consists of the following specifications:

Pre-cast concrete footing: 4,000 psi minimum strength; 60 inch outside diameter; 24 inch inside diameter (open hole); 7 inch thick. Manufactured by Rockford Cement Products Co.

Pre-cast concrete riser barrel: 4,000 psi minimum strength; 36 inside diameter, 5 inch thick wall, 24 inch high. Manufactured by Rockford Cement Products Co.

Steel manhole frame and watertight cover (with gasket seal), Model 1585: 36 inch outside diameter at top; 34 inch inside diameter at cover; 45 inch outside diameter at bottom; 8.5 inch tall. Manufactured by East Jordan Iron Works.

Prior to setting footings, planning work was conducted to determine the final asphalt grade on Marshall Street with respect to the existing street and the stormwater drains. The RA Subcontractor used a survey station (tripod, laser level, level rod, and rod-mounted laser level detector) to determine the top grade elevation of each extraction well vault manhole cover. Based on this elevation, the bottom elevations of the extraction well footings were calculated.

Additional limestone gravel was added around each extraction well and leveled to the required elevation. A walk-behind diesel plate compactor (approximately 1,000 lbs operating weight) was used to compact and spread the gravel base prior to final grading check. Once elevation was set and level, the concrete footing was set in place around the extraction well. The excavator bucket was used to hoist the footing into place by connecting chains to rebar lifting hooks embedded in the concrete.

The rebar lifting hooks were sawed off and a ring of black mastic was set on the concrete footing. The pre-cast concrete riser was set on the mastic ring, also hoisted by lifting hooks, chains, and excavator bucket. Another mastic ring was set on the concrete riser, and the steel manhole frames were set in place on the mastic ring by hand.

3.2.5 Additional Backfill and Compaction

3.2.5.1 Trench Backfill and Compaction

After each of the extraction well vaults were set in place and the 3 to 4 inch layer of limestone gravel was placed over the electrical conduit, all remaining backfill and compaction in the trench was completed. Excess limestone gravel stockpiled on the south side of the trench area was placed into the trench on the south side around EW-3 and sloped down towards EW-2. At EW-3, the level of limestone gravel was above the top of the well vault concrete footing. This was the only one of the three extraction well vaults that had additional limestone gravel placed around the concrete footing. Excess limestone gravel stockpiled on the north side of the trench area was placed into the trench on the north side near the well valve vault and at the bend in the trench.

The remainder of the trench was backfilled with a well graded sandy common fill above the limestone gravel. The IDOT material code for the sandy common fill is FA06. An aggregate gradation report for this material is provided in **Appendix B.** After the first approximately 6- to 12-inch sand lift was placed and compacted, buried electric line caution tape was placed along the entire trench above the process pipe and electrical conduit run. Additional lifts of sand were placed and compacted above the caution tape up to the elevation at 12 inches below the bottom of the permanent paving.

Backfill was compacted initially with the walk-behind diesel plate compactor (approximately 1,000 lbs operating weight). Once the trench was accessible, the backfill was compacted using a steel wheel roller (single steel wheel and two rear tires). The walk-behind compactor was always used directly adjacent to each extraction well vault rather than the steel wheel roller to minimize damage or movement of the steel manhole frame until backfill was completed.

3.2.5.2 Road Gravel Base Backfill, Compaction, and Grading

After sufficient backfill and compaction of the trench area, additional existing road gravel base was removed from the entire road area adjacent to the trench. This additional material was removed by the RA Subcontractor to create a graded road surface, and did not impact construction cost. Existing road gravel was excavated and stockpiled near the treatment unit area for use as fill around the treatment unit.

Surveying of the road area was conducted and the road grade was adjusted accordingly to achieve proper drainage towards the north stormwater drains and to ensure drainage away from each extraction well vault manhole. Several grade stakes were placed along the east and west edges of the road and were marked with the 12 inch layer of road gravel base, the 1.5-inch asphalt binder course, and the 1.5-inch asphalt top course.

Even 4- to 6-inch lifts of road gravel base were placed on the entire road area. A well graded gravelly sand was used for the road gravel base, material code CA06. An aggregate gradation report for this material is provided in **Appendix B.** Each lift was graded and compacted up to the required bottom elevation of the asphalt binder course. Compaction was completed with a steel wheel roller and a walk-behind diesel plate compactor adjacent to each extraction well vault manhole.

3.2.5.3 Compaction Density Testing

Compaction density testing was completed at two phases of the backfill process: during the trench backfill phase and the road gravel base layer phase. The Contract Documents specified the following frequency of testing:

- In Streets (upper foot): 1 test per 6-inch lift at a minimum of 3 locations
- In Streets (18 inches and deeper): 1 test per 12 inches at a minimum of 3 locations

The requirement to perform a set of density tests at each 12-inch compaction lift within the trench was not considered necessary for the RA; therefore, only one set of tests were performed for the trench backfill material. This set of tests was considered representative of the compaction density for the remainder of the compaction lifts.

The first set of compaction density tests were performed at three locations of the compacted sandy trench backfill at approximately 6 to 12 inches below the road gravel base bottom elevation. This testing was considered to meet the requirement for street areas at 18 inches below grade or deeper. The three areas tested were as follows: test 1 between EW-1 and EW-2, test 2 to the north of EW-1, and test 3 between EW-1 and EW-2 but closer to EW-2. Testing was performed using a nuclear gauge between depths of 6 inches to 24 inches below the compacted surface. Results of the testing passed the specification compaction requirement of greater than 95% of maximum dry density.

The second set of compaction density tests were performed at three locations of the compacted road gravel base at approximately 6 inches below the asphalt binder course elevation. This testing met the requirement for street areas at 12 inches below grade. The three areas tested were as follows: test 1 between EW-3 and EW-2 ,test 2 between EW-2 and EW-1,, and test 3 to the north of EW-1. Testing was performed using a nuclear gauge at a depth of 6 inches. Results of the testing passed the specification compaction requirement of greater than 95% of maximum dry density.

3.2.6 Stormwater Drain Modification

Per the City of Rockford's request and in order to set the proper drainage gradient, the elevations of the two stormwater drains on Marshall Street were modified (north end of the work area). This work was outside of the scope of work for the RA, but was completed by the RA subcontractor with no significant added cost.

The stormwater drain on the west side of the street was lowered one brick level (approximately 3") and the stormwater drain on the east side of the street was raised one brick level (approximately 3"). The existing steel lids and bases for the stormwater drains were removed. On the west side, one layer of existing bricks were chiseled and hammered out of place. Some extra brick was removed accidentally, but mortar was added to set the proper level. The mortar used was SPEC MIX® Mortar Portland Lime and Sand, Type N, Product No. PL-04, manufactured by Packaged Concrete Inc. Bricks used for raising the level on the east side were from Rockford Cement Products and were of the same manufacturing type and specifications of the bricks used to raise the level of the riser on the EW-1 well vault, expect these bricks were large in size. The bricks were mortared with SPEC MIX® and the steel bases were set on the bricks/mortar. The outside edges of the steel bases for both stormwater drains were also mortared in place. All concrete debris was removed from the bottom of the sewer drains upon completion of the work and the steel grates and sediment filter traps were set back in place.

3.2.7 Asphalt Pavement

The edges of the existing asphalt pavement surface on the north and south ends of the work area were smoothly cut with a walk-behind or hand cutting saw. Following final grading as described in Section 3.2.5, a new asphalt pavement was laid in accordance with the Contract Documents. The asphalt consisted of a 1.5 inch binder course and a 1.5 inch top course. Mixture design specifications for each course are provided in **Appendix B.**

Both binder course and top course were laid using an 813 RT Propaver machine by McAllister Equipment Co. Courses were laid in two strips using the Propaver machine along both sides of the well vault manholes (which are approximately in the middle of the road). All pavement edges were smoothed and leveled using hand tools, which includes edges at existing pavement, around stormwater drains, well vault manholes, sidewalk on the east side of the road, and the PZ1 cap. Binder course was compacted immediately after placement using a double steel wheel rolling compactor. Edges were compacted using a walk-behind vibratory plate compactor. Top course was also compacted immediately after placement using the same equipment. Following sufficient time for settling and temperature stabilization (approximately one-half hour), final compaction of the top course was completed.

3.2.8 Work Area Cleanup and Seeding

3.2.8.1 Marshall Street Right of Way Areas

The right of way along the west side of Marshall Street was re-graded and restored upon completion of the asphalt work. Lowering of the northwest stormwater drain resulted in a change in grade and road elevation along the west side of Marshall Street. This resulted in a need to re-grade the right of way slope.

The right of way between the south end of the work area limit and the electrical pole was sloped to approximately 3:1 (horizontal to vertical), and additional topsoil was added to the area as needed. Topsoil stockpiled from the cross country pipe trench to the west of the well valve vault was used as topsoil for the Marshall Street right of way area. After sufficient topsoiling and grading, grass seed mix was hand broadcast and loose straw mulch was added to the entire area. The grass seed mix was selected as a fall planting blend, which was determined to be more appropriate than the seed mix specified in the Contract Documents. The following are specifications for the seed mix:

- 34.00% Rival™ Brand Annual Ryegrass
- 33.87% Tonga Tetraploid Perennial Ryegrass
- 31.00% DUO Festulolium
- 0.12% other crop
- 0.90% inert matter
- 0.11% weed seed (not noxious weed seed)

After installation of the well valve vault cover, restoration of the right of way and areas around the well valve vault was completed. Limestone gravel was added beneath and around the well valve vault covers drain pipes. Stockpiled topsoil from the cross country trench excavation was then backfilled around the well valve vault. Additional topsoil used for restoration was brought from an offsite location, supplied by the RA Subcontractor. The layer of topsoil was at a minimum depth of 4 inches as specified in the Contract Documents.

Grading on each of the four sides of the well valve vault was completed to match surrounding conditions. Slope grading on the east side of the well valve vault was limited by the elevation of the stormwater drain. Since this drain was lowered by approximately 3 inches, the grade on the east side of the well valve vault was steeper than expected. After all grading was completed seed mix was hand broadcast throughout the restoration area. Erosion control blanket was placed on most of seeded areas (i.e., north, east, and south sides of well valve vault). Erosion control blanket was secured with 6-inch landscape metal staples. Loose straw was placed on the seeded area to the west of the well valve vault.

3.3 Extraction Well Equipment Installation

3.3.1 Extraction Well Installation

As part of the pilot testing fieldwork activities conducted in July and August of 2006, the three groundwater extraction wells (EW-1, EW-2, and EW-3) were installed in Marshall Street, approximately 200 feet northwest and downgradient of the former loading dock at Area 4. The extraction wells were installed using sonic drilling methods by CDM's drilling subcontractor, Boart Longyear of Schofield, Wisconsin. Each well was installed to a depth of approximately 60 feet below ground surface (bgs). They were installed within Marshall Street along a north-south trending line, approximately 28 feet apart and downgradient of the primary and secondary contamination sources. The wells were placed east of the center line of the road to avoid a sewer line that runs down the middle of the street.

During drilling operations, soil was continuously sampled using a 10-foot long core barrel and logged by CDM's field geologist in accordance with the United States Classification System (USCS). Soil was field screened using a photoionization detector (PID) and all readings were noted on the soil boring logs included in **Appendix C**. To ensure that the extraction wells were sufficiently productive for aquifer testing and for future use as part of a permanent groundwater extraction system, they were constructed of 6-inch diameter, schedule 80 polyvinyl chloride (PVC) well casing with a 35-foot screen comprised of #80-slot, V-wire wrapped PVC, manufactured by Johnson Screens Inc. of New Brighton, Minnesota. Extraction well construction details are provided in **Appendix C**.

Each extraction well was developed with a pump and surge technique. The wells were mechanically surged using a Smeal® development rig with a 6-inch fitted surge block. Surging occurred in 3-foot lifts for the entire length of each screen. After surging, sediment that was drawn into the well was removed with a bailer and wells were resurged as necessary. The wells were then pumped at approximately 30 to 40 gallons per minute (gpm). The pump was moved up and down the screen interval at each well and continued until the purged groundwater appeared clear and free of fine sediments. Development activities produced approximately 15,000 gallons of purge water. The water was stored onsite in a 21,000 gallon steel frac tank and was treated with a temporary treatment system prior to release to the concrete-lined ditch northwest of Area 4.

3.3.2 Extraction Well Equipment Installation

Each extraction well was equipped with the following major components, which are described below:

- Well packer
- Submersible pump and shroud
- Submersible water level transducer
- Level switches

On October 29, 2009, well packers were placed in each well at a depth of approximately 42 feet bgs with the screened interval below the packer remaining open. The intent of setting well packers at this depth was to target the upper, contaminated portion aquifer for pumping and contaminant removal. Each packer assembly consists of two, flexible vinyl packers (model no. P425L) manufactured by Griffitts Well Packers. The packers are "stacked" one on top the other and connected with 4-inch PVC. A bushing was installed on the top packer to facilitate removal of the packer assembly with a rod, if necessary. The packer arrangement differed from the Contract Documents, which specified an inflatable packer, because the pressure required to inflate the packer could potentially damage the screen.

Following installation of the packer assembly at each well, a submersible pump was placed in each extraction well with the pump intake at an approximate depth of 37 feet bgs. The pumps installed are 4-inch diameter Grundfos model number 25S10-7 capable of pumping between 18 and 32 gpm. Further, to ensure proper cooling of the pump under operating conditions, each pump was placed within a "shroud" that consisted of a 4-foot length of 4-inch diameter PVC screen. Placement of the submersible pump within the shroud was not specified in the Contract Documents; however, this addition did not add any significant cost to the RA construction. Finally, a discharge tube consisting of schedule 80 PVC was attached to the pump.

Transducers and water level probes were installed in each extraction well on November 17, 2009. The transducers installed are Global Water WL400 Water Level Sensor. Each transducer was set at approximately 32 feet bgs.

Three Gems Sensors ATB3 water level switches were installed in each well to control operation of the pumps in case of low water level conditions that could result in damage to the submersible pumps. The level switches were installed at the following depths:

- Low level switch at 35 feet bgs (2 feet above the pump inlet)
- Neutral level switch at 33 feet bgs (4 feet above the pump inlet)
- High level switch at 30 feet bgs (7 feet above the pump inlet

An as-built diagram of the extraction well components is included in **Appendix C**.

3.4 Well Valve Vault

Description of trenching, placement of the well valve vault structure, and connection of piping and electrical conduit to the well valve vault were provided in Section 3.2. This section presents the details of installation of equipment and electrical components in the well valve vault, as well as the specifications for the well valve vault structure and lid. The as-built plan for the well valve vault and its contents is included in **Appendix C**.

3.4.1 Structure and Lid

Concrete used to manufacture the well valve vault has a minimum strength of 4,500 psi. The well valve vault floor and walls were constructed using #6 rebar on 12 inch vertical and horizontal centers. The interior of the well valve vault consists of two rooms separated by a center concrete wall 6 inches wide. The south room contains the pressure piping and equipment and the north room contains the electrical components and control panel. The interior dimensions of each well valve vault room are 4 feet by six feet. All walls and the floor of the well valve vault are 6 inches thick. The walls are 6 feet high on the interior. Pressure piping and electrical conduit enter the vault through the 4-foot long wall sides.

The well valve vault lid consists of two aluminum access hatches set in a pre-cast concrete base. The access hatches were manufactured by Haliday Products, Inc. and the pre-cast concrete base was manufactured by Rockford Cement Products Co. Each access hatch has the following features and specifications:

- Two ¼ inch thick aluminum tread plate covers set on stainless steel hinges with tamperproof fasteners
- ¼ inch thick aluminum frame extrusion around perimeter of cover (structural frame and allows water drainage)
- T-316 stainless steel hardware (i.e., hinges, fasteners, and bolts)
- Stainless steel and aluminum positive locking hold open arm with stainless steel spring assist
- 1 ½ inch drain coupling attached to PVC pipe drain
- Recessed lift handle and stainless steel slam lock with key
- Rubber sealing gasket attached to exterior of frame extrusion
- H-20 load rating

The concrete base was cast with the access hatches set in place by stainless steel anchor bolts. The rubber gasket around the exterior of the access hatch frame provides a water tight sealed structure. Concrete used to manufacture the well valve vault base has a minimum strength of 4,500 psi, and was formed using #6 rebar on 12 inch vertical and horizontal centers. The concrete base is 6 inches thick and has exterior dimensions of 72 inches by 114 inches. The concrete base also has a center concrete divider that sets on the center concrete wall of the well valve vault. The entire lid structure (concrete base and access hatches) was set onto the well valve vault structure using a lifting crane. Mastic was placed between the well valve vault and lid structure along all perimeter contacts.

The inside of each well valve vault room is accessed by steps installed on the west walls (three steps on each wall). The steps are constructed of grade 60 steel encased in polypropylene coating, and have a treaded grip top surface. The steps were set in place when the well valve vault was cast. Steps are set into the wall by a distance of 3 3/8 inches and protrude from the wall by a distance of 5 ¾ inches. The steps are 12 inches wide.

Round sumps in each room of the well valve vault were originally constructed of fiberglass, with dimensions of 18 inch interior diameter by 24 inches deep. As a result of construction deficiencies described in Section 3.2.2 (vault flooding and subsequent pumping through sump holes) the fiberglass sumps were replaced with cast in place concrete set by a form. The form was constructed of a standard 5 gallon plastic bucket, with dimensions of 11 ½ inches diameter by 14 ½ inches deep See Section 3.2.2 construction deficiencies for further details on injection of concrete beneath the well valve vault and casting the concrete sumps.

3.4.2 Process Pipe, Fittings, and Equipment

Each of the three 2-inch and 4-inch HDPE pipelines enter the well valve vault through holes in the east concrete wall, drilled to be approximately one inch greater diameter than the outside diameter of the 4-inch HDPE pipe. The 4-inch HDPE pipe is terminated (open draining) on the inside of the well valve vault. Link seals (Link-Seal® LS-300) were placed around each 4 inch HDPE pipe, which provides a water tight seal around the pipe.

Inside the well valve vault, the 2-inch HPDE pipe is converted to Schedule 80 PVC pipe. Class 150 HDPE flanges are used to connect the influent 2-inch HPDE lines directly to the flow meters. A steel bolt ring was fed onto the 2-inch HDPE influent pipes and the HDPE flange components were fused to the influent HDPE pipes. The type of steel bolt rings are Design Flow® convoluted ductile iron 2-inch IPS bolt rings, manufactured by Independent Pipe Products, Inc. PTFE type gaskets are used for each flange connection, and for all other flange connections in the well valve vault described below. The flow meters have the following specifications:

- Endress+Hauser Proline Promag 50P electromagnetic flowmeter, remote version with transmitter and sensor installed as separate units.
- 2 inch nominal diameter size with Class 150 steel flanged influent and effluent connections.
- PTFE lining material for use with chlorinated solvents.
- Transmitter housing unit with push button functions and digital flow display.

The flow transmitter housing units are installed on the electrical side of the well valve vault. Manufacturer installed wiring on the flow meters is fed through a small hole in the 6 inch thick divider wall. Details on electrical connections for the flow meters are provided in the section below on well valve vault electrical.

On the effluent side of the flow meters, Class 150 Van Stone Style PVC flanges connect to the 2 inch schedule 80 PVC pipe. After approximately 5 inches of PVC pipe, 2 inch to ¾ inch schedule 80 PVC reducing tees are installed for connection of the sample ports and pressure gauges.

Vertical ¾ inch schedule 80 PVC riser pipes are installed on each reducing tee, followed by ¾ inch schedule 80 PVC tees, which connect to each sample port and pressure gauge. The sample ports are stainless steel sink faucet valves with ½ inch NPT male inlet and four arm handles. The top side of the ¾ PVC tees is attached to 100 psi maximum pressure gauges via ¾ inch schedule 80 PVC riser pipes and lab ball valves.

A one to two inch section of 2-inch schedule 80 PVC is installed on the effluent side of each reducing tee, followed by the 2-inch schedule 80 PVC butterfly check valves. The butterfly check valves have flanged influent and effluent connections and a Viton® o-ring material. A three to four inch section of 2-inch schedule 80 PVC is installed on the effluent side of each butterfly check valve, followed by the two inch schedule 80 PVC wafer butterfly valves. The wafer butterfly valves are a lever handle type and they also have flanged influent and effluent connections and a Viton® o-ring material.

On the effluent sides of the wafer butterfly valves (flanged connection), additional schedule 80 PVC and fittings are installed to connect all three pipes to one influent pipe for the treatment unit. Schedule 80 PVC tees and an elbow are used to complete these connections. Note that all piping (from the flow meters past the wafer butterfly valves) is secured to the concrete floor using pieces of unistrut bolted to the floor. Unistrut straps are placed around the piping to secure the piping.

After the junction on the three influent pipes, the single process pipe is attached to another sample port and pressure regulator with the use of a 2-inch to ¾ inch schedule 80 PVC reducing tee. The sample port and pressure regulator are installed in the same manner as described above for each influent pipeline. Following about five to six inches of additional schedule 80 PVC, the final wafer butterfly valve is installed. The specifications for the wafer butterfly valve are the same as described above for each influent pipeline.

The effluent side of the wafer butterfly valve is attached to a Class 150 HDPE flange. As for the influent HPDE pipelines, a steel bolt ring was fed onto the 2-inch HDPE effluent pipe and the HDPE flange component was fused to the HDPE pipe. This connection completes the PVC pressure piping system in the well valve vault and converts the piping back to 2-inch HPDE for connection to the treatment unit. The setup of the effluent side double containment 4-inch HDPE pipe is the same as for the influent pipes to the well valve vault. The 4-inch HDPE pipe open drains through the west wall and is secured using link seals (Link-Seal® LS-300).

3.4.3 Electrical

Nine PVC conduits from the well vaults convert to galvanized steel just before entering the vault. Conduit enters the vault through holes in the concrete wall drilled to be approximately one inch greater diameter than the outside diameter of the 1-inch conduit. Link seals were placed around each of the galvanized conduits to form a water tight seal.

Handholes were not installed in the instrumentation and control conduits as shown on the Contract Documents. Instead, each instrumentation and control conduit was installed as a dedicated "home run" between each well vault and the valve vault. Conduits are pitched to allow drainage away from the wells.

3.5 Cross-Country Process Pipe and Electrical Installation

This section describes the installation procedures and specifications for cross-country pipe and electrical conduit and wiring between the well valve vault and the treatment unit. Piping and electrical connections at the well valve vault are described in Section

3.4 above. Piping and electrical connections at the treatment unit are described in Section 3.7 below. The as-built site plan showing the cross-county routing of the process pipe and electrical conduits is included in **Appendix C**.

3.5.1 Process Pipe

3.5.1.1 Process Pipe Installation

Process pipe was installed cross-country between the well valve vault and the treatment unit by directional boring. Directional boring was the chosen method of installing cross-country pipe, rather than trenching, due to the limited space for excavator work and the long distance required (greater than 350 feet). Piping was installed in a southwest-northeast trend along the south side of the concrete drainage ditch, as specified in the Contract Drawings. Prior to starting directional boring, trenches were excavated on both ends of the piping run to intercept the boring. A directional boring unit was set up on the southwest side of the piping run, near the treatment unit area. Prior to starting the boring, surveying of the top surface of the pipe run was performed in order to determine the minimum required directional boring slope to maintain the 4 foot depth of piping.

Directional boring and pulling of the 4-inch containment pipe and 2-inch process pipe was completed in one day. Directional boring was terminated within a trench to the southwest of the well valve vault. A steel pulling rod with HDPE pipe attachment was fused to the 4-inch HDPE pipe and attached to the drill head. The directional boring machine was then used to pull the 4-inch HPDE pipe through the directional boring hole. Prior to pulling, 40-foot sections of 4-inch HDPE pipe were fused together for a total of 360 feet and laid out across Marshall Street and along the concrete drainage ditch. An insulated steel wire (for magnetic detection) was attached to the outside of the 4-inch HPDE pipe and pulled through the boring along with the pipe.

Once pulling of the 4-inch HDPE was complete, the northeast end of the pipe was fed through the 6-inch hole in the well valve vault wall. A pull rope was then fed back through the 4-inch HDPE pipe using the directional boring machine. The 2-inch HDPE pipe was fused with a steel pulling head and attached the pulling rope. The other end of the rope was tied to a truck hitch to pull the 2-inch HPDE pipe through the 4-inch HPDE pipe. One continuous piece (e.g. no fusing) of 2-inch HPDE was fed between the well valve vault and the treatment unit.

Directional boring and pulling of the process pipe was conducted along a linear trend. Due to the orientation and placement of the treatment unit, the effluent end of the process piping had to be bent towards the south to match the required position of the treatment unit. Surveying was conducted within the treatment unit area to determine the exact location of the treatment unit building and foundation. As part of surveying, building corners were staked and flagged. Based on this alignment, a curved trench was excavated (4 foot minimum) between the existing pipe run and the treatment unit. The existing section of buried process piping was then unearthed and bent into the new curved trench towards the treatment unit area.

For connection to the treatment unit, the process piping had to achieve a 90 degree turn to come up through the floor of the treatment unit building. Rather than install 90 degree elbow fittings on the HDPE, the piping was bent gradually up to the treatment unit building floor area. As result, some piping had to be placed above the 4-foot depth requirement. As such, this section of piping was insulated with foam insulation and a sleeve jacket, as specified in the Contract Drawings.

3.5.1.2 Trench Backfill and Compaction

The trench on the northeast end of the directional boring (adjacent to the well valve vault) was initially backfilled with approximately three 1-foot lifts of sandy common fill (FA06). Compaction of backfill lifts was completed using the walk-behind diesel plate compactor (approximately 1,000 lbs operating weight). Trench spoils were then placed and compacted above the sandy common fill. The remainder of the trench was backfilled with poorly graded limestone gravel (CM07) up to the electrical conduit grade (minimum 2 feet below ground surface). Aggregate gradation reports for FA06 and CM07 materials are provided in **Appendix B.**

The trench on the southwest end of the directional boring (adjacent to the treatment unit) was backfilled with trench spoils from the excavation. Compaction was not completed on this backfill, except for rolling the top surface with the track mount excavator.

3.5.1.3 Process Pipe Pressure Testing

Hydrostatic pressure testing with compressed nitrogen gas was completed on the 2-inch HDPE pipe between the well valve vault and treatment unit. The effluent side of the HDPE pipe was still capped with the pulling rod. The influent side of the HDPE pipe (in the well valve vault) was connected to a testing apparatus that consisted of the following with appropriate fittings (in said order): 1) 2-inch HDPE pipe flange adapter with reducer to 1-inch brass pipe, 2) 160 psi pressure regulator, 3) ball valve, and 4) gas hose quick connect adapter. Testing was performed in accordance with the specifications as indicated by the following observations:

- The 2 inch line was pressurized with compressed nitrogen gas up to approximately 150 psi (50% above operating pressure).
- The pipe remained pressurized for a period of up to one hour to monitor for leakage and any change in the pressure reading.
- No drop in pressure was noted during the hour testing period and so no leaks were observed. The testing was considered complete after the hour period.

3.5.2 Electrical

3.5.2.1 Conduit and Handholes

Four runs of electrical conduit between the well valve vault and treatment unit were installed after the directional boring for process piping was completed. Using a small track mount excavator, a 2-foot wide by 2-foot deep trench was excavated between the well valve vault and the treatment unit area. At approximately half the distance along the trench excavation, a significant amount of trash debris was encountered that had to be removed, including concrete rubble, stumps and roots, and miscellaneous trash. This material was removed from the excavation area and disposed off site.

Four runs of schedule 40 rigid PVC electrical conduit, including one spare, were installed directly on the trench bottom. Connections to the previously installed conduit at the well valve vault north wall were made first, followed by ten foot sections connected with PVC glue. Two electrical handholes were installed between the well valve vault and the treatment unit. The handholes were installed at approximately one-third and two-thirds the distance of the cross-country electrical and piping run. Handholes are 24 inch by 24 inch Polymer Concrete (Quazite) boxes, with a removable top that is bolted and has a water sealing gasket.

3.5.2.2 Trench Backfill and Compaction

The electrical conduit trench was initially backfilled with approximately 3 to 6 inches of poorly graded limestone gravel (CM07), followed by the buried electric line caution tape, and then another 3 to 6 inches of limestone gravel. Trench spoils were placed above the gravel layer up to grade. Compaction and grading was completed with the small wheel loader. An aggregate gradation report for the CM07 material is provided in **Appendix B**.

3.5.2.3 Wiring

After completion of the underground conduit installation, power and control wiring were pulled into the conduit. Two conduits contain power feeders, installed using type THHN/THWN wire: A common power feeder to the extraction wells and a power feeder to the well valve vault freeze protection. A 6-strand multimode fiber optic cable was installed in the third conduit for controls communication. A nylon pulling rope was installed in the fourth conduit, designated as spare.

3.6 Construction of Treatment Unit Foundation

Backfill that was previously placed and compacted in the treatment unit foundation area was removed and stockpiled (approximately 18 inches of material). The corners and sides of the treatment unit foundation were then surveyed, staked, and string lines were snapped to the corners. The 4-inch and 2-inch HDPE pipe protruding up into the treatment unit area was used as a boundary condition to determine the orientation and placement of the treatment unit foundation. One 6-inch lift road gravel base (CA06) was placed and compacted beneath each of the concrete anchor pad areas for the foundation. An aggregate gradation report for this material is provided in **Appendix B**.

After the initial compaction, surveying was conducted to determine the bottom grade elevation of each of the concrete anchor pads. Additional gravel was added and compacted on the footing areas to achieve a consistent and level elevation between the three anchor pads. Once the gravel base elevations were set, the forms were constructed for the 18-inch by 18-inch concrete anchor pads. Forms and rebar were constructed in accordance with the Contract Drawings and Specifications. Four No. 5 rebar strands were installed along the length of the anchor pads at each corner of the block. Square sets of No. 3 rebar strands were then installed perpendicular to the No. 5 corners at 18 inch centers along the length of the anchor pads.

After setting of the rebar and forms, a final grading check was checked on the forms, and elevations were adjusted using wood shims. Once elevation was set, concrete was poured into each of the forms. Concrete was poured into the forms on October 8, 2009, and worked into place using a hand-held vibratory mixer along the entire length of each concrete pad. Finish trowels were then used to smooth the surface of each anchor pad. Forms were allowed to set until October 19, 2009, based on colder air temperatures at the time of installation.

Testing of the concrete used in the foundation forms was conducted in accordance with the Specifications. The following tests were conducted along with some of the results:

- Slump Test: 2 inches
- Air Content: 3.7%
- Temperature: 69 degrees F
- Air Temperature: 50 degrees F

Created one set of compressive strength cylinders, one 7-day, one 14-day, and two 28 day cylinders. Compressive strength numbers are as follows:

- 7-day: 4,270 psi
- 14-day: 5,250 psi
- 28-day: 5,910 and 5,790 psi

Copies of the concrete test results are provided in **Appendix B**.

Following removal of the concrete forms, the remaining foundation areas (in between the anchor pads) were backfilled and compacted with CA06 road gravel up to the grade of the anchor pads. The concrete foundation areas were coated with epoxy to protect them from chemical spills. The remaining work for installation of the treatment unit and attachment to the concrete anchor pads is provided in Section 3.7.

3.7 Installation of Treatment Unit

The treatment unit was delivered to the site on November 2, 2009, on a flat-bed trailer and hoisted into place with a crane. The treatment unit was manufactured by Maple Leaf Equipment (MLE) in general accordance with the Contract Documents. The as-built layout of the treatment unit is included in **Appendix C**.

Exact placement of the treatment unit was dictated primarily by needing to "thread" the process pipe influent line sticking up from the ground through a one foot by one foot hole in the treatment unit floor; however, the treatment unit was also placed securely on the concrete anchor pads. Following placement, metal shims were inserted between the bottom of the treatment unit frame and the concrete anchor pads to level the treatment unit. Over the course of the next month, electrical and mechanic connections to the treatment unit were implemented. All connections were made in general accordance with the Contract Documents.

Start-up of the overall system occurred on December 1 and 2, 2009. During this initial start-up period, various activities were conducted including testing, programming, inspection of mechanical connections, and training. All activities were performed in accordance with the Contract Documents and the start-up procedures provided by MLE. Minor leaking was observed at the connection to the lead liquid phase carbon vessel and was fixed.

Full-scale start-up of the system occurred in the afternoon on December 2, 2009. Samples for performance testing were collected at this time. Results are presented in Section 5.1. Routine oversight by CDM subsequently ended on December 7, 2009 after all primary construction activities had been completed.

3.8 System Modifications

Three significant modifications were subsequently made to the system or Contract Document requirements based on operational history as described in this section. The significant additional costs were incurred because of these changes.

3.8.1 Iron Treatment System

After several weeks of operation it became apparent that iron-related bacteria (IRB) were degrading system performance. The first evidence was that bag filters in the treatment unit had to be changed every two to three days and were coated with an orange material. Subsequently, iron fouling of the lead liquid-phase carbon vessel was observed.

In order to control the formation of the iron slime in the system, a temporary iron treatment system was installed on the system as a pilot test. The iron treatment system used Analytix Technologies AN-400 antiscalent and Tolcide PS-70A microbiocide injected into the influent process line as it enters the treatment unit. Based on the successful outcome of the pilot test, a permanent iron treatment system was installed beginning September 14, 2010. The iron control system consists of two

LMI Milton Roy E701-468SP chemical metering pumps injecting the AN-400 antiscalent at a rate of 0.8 gallons per day (gpd) and the PS-70A microbiocide at a rate of 0.5 gpd.

3.8.2 Treatment Unit Piping Insulation

During early summer 2010, extended periods of humid conditions resulted in significant condensation forming on the various pipes and pieces of process equipment that carry or contain process water in the treatment unit. The condensation eventually dripped onto the floor resulting in several millimeters of standing water on the floor of the treatment unit. Because the floor of the treatment unit is wood and prone to rotting, it was determined that all process piping and equipment should be insulated to reduce the formation of condensation.

During the week of July 12, 2010 insulation was applied. Armacell Armaflex 1-inch insulation was applied to all process equipment and 1-inch Armacell Armaflex pipe insulation with a vapor barrier jacket on the piping.

3.8.3 Extra Carbon Credit

One extra liquid-phase and one vapor-phase carbon vessel were specified in the Contract Documents. However, because there was no place available onsite to store the extra carbon vessels, delivery of the carbon vessels was cancelled and take a credit. Subsequently, this credit was applied to the additional work described in this section.

Section 4

Section 4
Chronology of Events

This section presents a tabular summary that lists the major events for the Southeast Rockford Groundwater Contamination Superfund Site Source Area 4 project and associated dates of these events beginning with the ROD signature. This summary table also provides estimated dates for subsequent RA activities including a timeframe to achieve groundwater restoration cleanup goals.

Date	Event
June 2002	EPA Record of Decision for OU3
March 2004	Phase I Pre-Design Sampling Activities
August –December 2005	Phase II Pre-Design Sampling Activities
September 2005	Interim Soil Removal
July-August 2006	Pilot Test and Extraction Well Installation
October 2007	Final remedial design submitted
June 2008*	Work plan development and negotiation
February 2009	RA Contract Award
August 2009	RA mobilization and Site preparation
August – October 2009	Installation of process piping, electrical components, well vaults, and well valve vault
October - December 2009	Installation of treatment unit foundation and treatment unit building and process equipment
November 2009	Baseline groundwater sampling event conducted
December 2009	Treatment unit startup, primary construction complete
February 2010	1st Quarterly groundwater monitoring event conducted
February 2010	Temporary iron treatment system installed
March 2010	Doyle Wilson becomes Illinois EPA project manager of SERGC
June 2010	2nd Quarterly groundwater monitoring event conducted
July 2010	Insulation applied to process equipment and piping
September 2010	Permanent iron treatment system installed
October 2010	3rd Quarterly groundwater monitoring event conducted
October 6, 2010	Pre-final and final inspection
October 6, 2010	Remedy declared O&F
To Be Determined	Estimated Date to Achieve Groundwater Restoration Cleanup Goals.

*Work plan development and negotiation began in early June 2008 with a site visit at Area 4 that included the Illinois EPA, CDM, and the RA Contractor's (Bodine) project managers. An initial scope of work/work plan and cost estimate was submitted by Bodine on August 22, 2008. Following negotiations, a revised SOW/WP and cost estimate was submitted to Illinois EPA on September 18, 2008, and a work order for the RA construction was executed by Illinois EPA on February 12, 2009.

Section 5

Section 5
Performance Standards and Construction Quality Control

This section describes the overall performance of the leachate control system in terms of comparison to the remedial objectives. In addition, this section discusses the remedy performance monitoring strategy and quality assurance and quality control (QA/QC) procedures followed.

5.1 Comparison to Performance Standards

The performance standards for the Site are presented in Section 2.2.1 and consist of groundwater remediation goals and effluent discharge limits.

The first annual GMZ monitoring report will include a detailed discussion of the current extent of groundwater contamination and treatment system performance (e.g., comparison to cleanup goals). The first annual GMZ monitoring report will be prepared following receipt of data from the fourth quarterly GMZ sampling event. Performance monitoring is ongoing at Area 4 in accordance with the long-term performance monitoring activities for the OU3 Area 4 leachate remedy as identified in the Groundwater Management Zone Scope of Work. Performance monitoring reports will be prepared periodically to assess the effectiveness of the leachate control system, the nature and extent of the groundwater contaminant plume and compliance with the GMZ requirements.

Effluent monitoring has been ongoing since system startup. The contaminant concentrations in the effluent have consistently been well below the discharge limits. The following table presents the influent and effluent concentrations for the VOCs listed in Table 2-1 from the first sampling event on December 3, 2009 and the last sampling event on October 7, 2010. Although other VOCs have been occasionally detected in the influent, effluent concentrations for all VOCs have generally been below detection limits. A comparison of the results indicates that the treatment system has been removing approximately 99.9 percent of the contaminants.

Table 5-1.
Influent and Effluent Analytical Results

Compound	Discharge Limit	Influent 12/3/2009	Effluent 12/3/2009	Influent 10/7/2010	Effluent 10/3/2010
1,1,1-TCA	390	1,500	<1.0	1,300	<1.0
1,1,2-TCA	4,400	2.8	<1.0	2.0	<1.0
1,1-DCE	240	10	<1.0	83	<1.0
Carbon Tet	280	<2.0	<1.0	<2.0	<1.0
PCE	150	4.1	<1.0	1.5	<1.0
TCE	940	8.1	<1.0	6.7	<1.0

Note: All concentrations are microgram per liter

5.2 Remedy Performance Monitoring Strategy

The ROD included continued groundwater monitoring as a component of Area 4 site activities. Additionally, components of the leachate control system will be monitored to ensure the system is performing as designed. As defined in the GMZ SOW, performance monitoring will be conducted at Area 4 until leachate RAOs have been met.

Monitoring wells both upgradient and downgradient of the GMZ boundaries will be used to determine the effectiveness of the extraction wells in containing the groundwater contamination. However, it should be noted that groundwater contaminant concentrations will likely remain well above remediation goals until the actual contaminant source has been remediated.

The samples will be collected as specified in the GMZ application for Source Area 4 and GMZ monitoring SOW. The monitoring well sample concentrations will be compared to the remediation goals established in the ROD. The leachate treatment system liquid influent and effluent concentrations will be collected monthly to determine the effectiveness of the treatment system. The effluent results will be compared to the discharge requirements established in the ROD. The effluent vapor stream from the vapor phase carbon units will be monitored monthly for VOCs with a PID to determine that the VOC discharge rate remains below 8 pounds per hour. However, based on calculating the total mass of VOCs in the liquid effluent, vapor monitoring may be discontinued.

5.3 Assessment of Data Quality

During the Area 4 leachate RA construction, no documented field audits were performed, however the Illinois EPA Project Manager, Thomas Williams did conduct weekly site visits to monitor the RA progress and compliance with the RD plans and specifications. In addition, data QA/QC assessments will be provided within the performance monitoring reports that discuss compliance with and/or deviation from the approved QAPP/SAPs for the GMZ and system monitoring activities.

Section 6

Section 6
Final Inspections and Certifications

This section presents a summary of the results of the various Southeast Rockford Groundwater Contamination Superfund Site Source Area 4 RA contract inspections, health and safety concerns during RA construction, implementation of ICs, and remedy O&F determination.

6.1 Remedial Action Contract Inspections

6.1.1 Field Audit

Formal audits were not conducted during the Area 4 Leachate Control System RA construction and start-up. The Illinois EPA Project Manager, Thomas Williams conducted weekly site visits to monitor compliance with the RA plans and specifications. In general, construction deficiencies that were identified were discussed with the Illinois EPA Project Manager and CDM and resolved as described in Section 9.

6.1.2 Pre-Final Inspection

The pre-final inspection was conducted on October 6, 2010 and the checklist is included in **Appendix E**. Representatives from Illinois EPA, U.S. EPA, CDM, and Bodine were present. Several punch list items were identified including areas of bare vegetation and removal of construction debris. Because the punch list items were all minor and did not impact operation of the overall treatment system, the inspection was considered to be the final inspection and the remedy was declared O&F.

All punch list items have been completed except posting warning and informational signs at the site for long-term groundwater remedial action (LTRA). These signs are currently being produced and their placement will be documented in a letter to the Illinois EPA Project Manager.

6.2 Health and Safety

The primary health and safety concerns at the Site were contaminant exposure, weather exposure (heat and cold stress), motorized traffic, and general Site concerns (slips, trips, and falls; safe use of equipment). At the time of this report, no accidents or events relating to health and safety have occurred at the Site.

6.3 Institutional Controls

ICs, as defined in the ROD, include the restriction of groundwater use within the Area 4 CMZ. The primary IC for the entire SERGC is through ordinances enacted by the City of Rockford and Winnebago County restricting the installation of private water supply wells. Previously, Illinois EPA notified appropriate property owners regarding the presence of the groundwater contamination as a condition of the OU1 and OU2 RODs. The Illinois EPA and USEPA continue to coordinate additional institutional control activities.

6.4 Remedy Operational and Functional Determination

The National Contingency Plan (NCP), Title 40 Code of Federal Regulations Section 300 (40 CFR§300.435[f][2]), states, "A remedy becomes 'operational and functional' either one year after construction is complete, or when the remedy is determined concurrently by the regulatory agencies [i.e., Illinois EPA and U.S. EPA] to be functioning properly and is performing as designed, whichever is earlier." During the O&F period, minor adjustments may be made to the remedy as it undergoes testing and shakedown. Formal O&F determinations are made for Fund-financed remedies because, in combination with the long LTRA period, the O&F milestone governs when EPA will turn the remedies over to the state for O&M. At a minimum, the attainment of O&F is documented in the Interim RA Report. The end of the O&F period initiates the LTRA period, which can have a duration of up to 10 years. It is important to note that for groundwater treatment remedies such as the OU3 leachate component RA at Area 4, the O&F determination does not imply that RAOs have been met, but rather than the remedy is operating properly.

For Area 4, Illinois EPA and U.S. EPA agreed that the remedy is officially O&F on October 6, 2010 after the final inspection had been completed the same day and after approximately one year of performance testing.

The remedy for the leachate component of the Area 4 RA was declared O&F because contaminant concentrations in groundwater immediately downgradient of the groundwater extraction system have decreased and the treatment of contaminated effluent is operating as designed. However, contaminant concentrations in groundwater further downgradient of the groundwater extraction system have not decreased and either the system has not been operating long enough to impact groundwater further downgradient or minor adjustments to the remedy, such as reconfiguring pump rates, will be needed. In addition, because there may be other sources of groundwater contamination in the vicinity of Area 4 that have not been identified, this groundwater further downgradient is potentially being impacted by a source other than Area 4.

Section 7

Section 7
Long-Term Monitoring Activities

This section summarizes the general activities for post-construction operation and maintenance (O&M) such as ongoing groundwater and effluent monitoring activities. Detailed information regarding the implementation of long-term performance monitoring for the Area 4 leachate component is provided in the Source Area 4 Draft Groundwater Management Zone Monitoring Sampling and Analysis Plan (CDM 2010) and Draft Sampling and Analysis Plan, Source Area 4 Remedial Action (Bodine 2010).

7.1 GMZ Monitoring

Quarterly groundwater monitoring is planned to continue through June 30, 2013. This groundwater sampling is a required component of the GMZ application, Section 2.2 f. The wells to be sampled include: extraction wells EW1, EW2 and EW3, MW401A, MW401B, MW22A, MW22B, MW32, MW130A, MW130B, and all five sampling ports of multi-level well MLW-01. The monitoring wells will be sampled using a low-flow submersible pump and the three extraction wells will be sampled directly from the tap on the water lines leading to the leachate treatment system. The *samples will be collected in accordance with the most current* Quality Assurance Project Plan and Sampling and Analysis Plan Addenda for Area 4.

Groundwater quality from these wells will be compared to the baseline conditions and will be evaluated for changes over time. After June 30, 2013, the frequency of monitoring may be reduced to semiannually if the results indicate consistency in groundwater concentrations. Any changes to the GMZ monitoring schedule or network are subject to the approval of Illinois EPA.

7.2 Treatment Unit Performance Monitoring

The leachate treatment system liquid influent and effluent samples will be collected monthly during operation of the leachate control system to determine the effectiveness of the treatment system. The results of the laboratory analysis for the effluent will be compared to the influent concentrations of the treatment system to determine if the treatment system is performing as designed. The effluent will also be compared to the discharge requirements established in the ROD.

The effluent vapor stream from the vapor phase carbon units will be monitored by calculating the total VOC mass in the liquid influent stream to confirm that the total VOC discharge rate is well below the 8 pounds per hour discharge requirement. If the total liquid influent VOC mass exceeds 10,000 ppb, tedlar bags will be used to collect vapor effluent samples. In addition, if the liquid influent total VOCs concentrations are such that the vapor discharge limit cannot be exceeded, the vapor carbon tanks may be taken off-line.

7.3 Treatment System Operation and Maintenance

Routine O&M of the treatment system will be performed in accordance with the O&M manual and schedule provide with the treatment system (MLE 2009) as modified by the O&M Contractor. All inspections and O&M activities will be documented on an Operations Log that will be completed by the O&M Contractor. The O&M schedule and a blank Operations Log sheet are included in **Appendix C**.

Section 8

Section 8
Summary of Project Costs

Consistent with U.S. EPA guidance (U.S. EPA 2000), a summary of project costs is provided within this Interim RA Report. According to the guidance, the total project costs are to be compared to the estimates presented within the ROD, adjusted to the same dollar year basis as the actual project costs based on the ENR (Engineering News-Record) Construction Cost Index for Chicago (ENR 2011). This cost comparison is provided below.

Description	Value
ROD Capital Cost Estimate (2009 dollars)	$397,822
Final Construction Cost	$887,835
Variance	123%

However, as a result of the substantial changes to the remedy for this project from the assumptions made in the ROD, the ROD Capital Cost Estimate and Final Construction Cost are generally not comparable. These substantial changes are described below.

- **Groundwater Extraction Rate:** The ROD assumed that groundwater would be extracted and treated at a rate of approximately 20 gpm. However, results from a groundwater pump test and subsequent capture zone modeling as described in Sections 1.5.3 and 2.2.1.2, indicated that a total pumping rate of approximately 60 gpm would be needed to maintain hydraulic control of the contaminant plume. Finally, to provide an appropriate safety factor in routine operation, the treatment system was designed to operate at a maximum capacity of 75 gpm, which is over three times greater than originally assumed in the ROD.
- **Process Equipment:** After pre-design work indicated the presence of free-product contamination in the aquifer at Area 4 as described in Section 1.5.3, it became necessary to incorporate an oil/water separator and liquid-phase carbon polishing to the treatment train. Neither of this treatment processes was factored into the estimated capital cost presented in the ROD.
- **Treatment System Location:** Although not specifically stated in the ROD, it is the implied assumption that the treatment system would be located at Area 4. However, as described in Section 2.2.1.2, the entire system location was constructed on publically-owned ROW. This change resulted in several changes with significant cost increases. First, the process effluent lines and control line/power supply conduits had to be buried and run approximately 400 feet from the extraction wells to the treatment system. Second, because the treatment system's location is adjacent to several underground utilities, the treatment unit needed to be installed within an intermodal container that can be quickly disconnected and moved in the event that emergency repairs to the underground utilities are required. Finally, a pad constructed of gravel and

concrete was required to provide a suitable foundation for the treatment system.

- **Iron Treatment System:** As described in Section 3.8.1, the formation of iron slime within the system required the installation of an iron treatment system to prevent a significant degradation of the system's operation.
- **Treatment Unit Piping Insulation:** As described in Section 3.8.2, large amounts of condensation formed on all process equipment during humid conditions resulting in standing water on the wood floor of the treatment unit. To prevent the formation of condensation, insulation was installed on all equipment that carries process water.

Instead, a more appropriate comparison of cost can be made by comparing the 100 Percent Design cost estimate to the construction cost. The costs are on the same dollar year basis. The resulting variance, although minor, is primarily the result of the iron treatment pilot test and subsequent permanent system, and treatment unit piping insulation.

Description	Value
100 Percent Design Cost Estimate	$799,649
Final Construction Cost	$887,835
Variance	9.93%

The above-referenced U.S. EPA guidance also requires a comparison of ongoing O&M costs that will be incurred. Annual estimated O&M presented within the ROD, adjusted to the same dollar year basis as the actual project costs based on the ENR (Engineering News-Record) Construction Cost Index for Chicago (ENR 2011), compared to the estimated O&M costs that will be incurred going forward are provided below.

Description	Value
ROD Annual O&M Estimate (2011 dollars)	$77,276
Current Annual O&M Estimate	$184,160
Variance	138.31%

The large variance between the two estimates is very close to the variance between the capital cost estimate in the ROD and the actual construction cost and it exists for many of the same reasons. For example, the annual estimated cost for the iron treatment chemicals described in Section 3.8.1 is $32,000. And although the iron treatment system does allow the treatment system to function as designed, the IRB present in the influent requires additional O&M activities such as weekly change-outs of the bag filters and quarterly cleaning of all process equipment as shown in the O&M schedule included in **Appendix C**. Further, the higher capacity treatment system that was constructed has a significant power draw with annual electricity charges estimated to be $21,000. Finally, the treatment system is generally more complex overall, which requires a greater level-of-effort to operate and maintain.

Section 9

Section 9
Observations and Lessons Learned

This section provides observations and lessons learned from implementation of the Source Area 4 Leachate Control System RA construction activities including problems encountered, and resolution if applicable. Overall, most of the problems encountered stemmed from the performance of the excavation RA Subcontractor and the RA Contractor indicated that that excavation RA Subcontractor would not be selected for future projects.

9.1 Trenching and Well Vault Placement Construction Deficiencies

- A structural fill gravel pad was not placed beneath the well valve vault as specified on the Contract Drawings. To correct this deficiency, the RA Subcontractor hired a testing company to perform a cone penetrometer test on the native soils present around the well vault. The test revealed a soil bearing capacity of 2,000 to 3,500 psi. Based on the footing dimensions of the well valve vault (6 foot by 8 foot) and the weight of the well valve vault (23,000 lbs), the load of the well valve vault is approximately 480 psi. Since the soil bearing capacity is greater than the well valve vault load, the native soils at the footing of the well valve vault were deemed acceptable for the load of the well valve vault, so a gravel footing was not required.
- Repeated heavy rain storm events caused significant erosion in the trench area both prior to and after the pressure pipe and electrical conduit were installed in the trench. The RA Subcontractor did not implement erosion control best management practices in the trench and work area to prevent run-on from entering the trench or to prevent erosion of the trench walls. Stormwater that flowed northward on Marshall Street was not diverted around the trench area. Storm events caused erosion of the trench walls, flooding of the trench and well valve vault, and sedimentation in the trench. The first storm event resulted in a minimum of one lost day of work in order to remove sediment and water from the trench and well valve vault areas.
- The second storm event occurred after all of the pressure pipe, containment pipe, and a majority of the electrical conduit were installed in the trench and graded to slope down towards the well valve vault. Pitless adapter connections to the process pipe were also made on each of the extraction wells. Significant erosion occurred after the second storm event, with most of the damage on the south end of the excavation area. Approximately 2 feet of sediment was deposited over top of the process pipe and pitless adapter connection at extraction well 3 (EW-3) after the storm. This resulted in at least one-half lost day of work in order to remove sediment and water from the trench to obtain a clean and mostly dry excavation bottom. Once the sediment material and water were removed, the pitless adapter connection on EW-3 was disconnected and the pipe was removed from the trench. Electrical conduit was also removed from the trench. New backfill material was placed in the

trench, and the pipe and electrical conduit were again installed and re-graded to proper slope.

- After the second storm event, the existing piezometers were also damaged. All soil around the top of piezometer 2 (PZ2) was eroded away, causing the concrete casing to bend the pipe over and crack the pipe. This piezometer was no longer usable and was backfilled over, but not properly abandoned by the RA Contractor (i.e., backfilled with bentonite and water). PZ1 and PZ3 were also damaged similarly; however, both piezometers were salvageable. Later during backfilling operations, the top of PZ3 was cracked by an equipment operator and had to be abandoned. Bentonite and water were poured into the PVC casing to abandon the piezometer.
- Flooding in the trench also caused flooding in the well valve vault. Water was pumped out of the well valve vault sump holes and discharged to the storm sewer in order to drain the vault and trench. Pumping after the two storm events caused erosion fractures to form underneath the well valve vault. As a result, the structural integrity of the soil below the well valve vault was potentially compromised. To correct this potential problem, lean concrete mortar mix was injected into the sump holes. The mortar used was SPEC MIX® Mortar Portland Lime and Sand, Type N, Product No. PL-04, manufactured by Packaged Concrete Inc. The mortar was mixed using an electric motor drum concrete mixer. Concrete forms were set into each sump hole in the well valve vault that consisted of a wood-framed 5 gallon bucket. Mortar was added around the forms, leaving a new sump hole the size of a 5 gallon bucket. Injected mortar was vibrated with a hand-held vibratory mixer to work it into the subsurface fractures.

9.2 Extraction Well Vault Construction Deficiencies

After placement of all three extraction well vaults, the RA Subcontractor determined that the footing for the EW-1 well vault was placed too low relative to the top of the extraction well, and the footing for the EW-3 well vault was placed too high relative to the planned street elevation. As a result, the RA Subcontractor had to readjust their plans for the final road grade, and correct the top elevations of the EW-1 and EW-3 well vaults.

For EW-1, concrete riser bricks were used to raise the elevation of the riser. The bricks were supplied by Rockford Cement Products Co. and have the following specifications: 7.62 inch length; 2.25 inch height; 3.62 inch width; and 4.85 lb weight; compressive strength average 6014 psi (from three compressive strength tests); meets ASTM C 90, "Standard Specification for Loadbearing Concrete Masonry Units." The steel manhole frame was removed from the riser barrel and one row of bricks were set and mortared in place (2.25 inches high) on top of the riser. The mortar used was SPEC MIX® Mortar Portland Lime and Sand, Type N, Product No. PL-04, manufactured by Packaged Concrete Inc. The mortar was mixed using an electric motor drum concrete mixer.

For EW-3, the top elevation of the riser barrel had to be lowered. Once the steel manhole frame was removed from the riser barrel, a concrete cutting saw was used to cut approximately 4 to 5 inches off the top of the riser. The cut was not completed to a level grade and was uneven, so the surface of the riser had to be smoothed and leveled using concrete mortar mix and a trowel. On the low end of the cut riser barrel, a 2 to 3 inch layer of mortar had to be added to create a level surface. No form was used to secure this mortar in place.

Concrete mortar applied to both of the modified extraction well vaults was allowed at minimum overnight drying (10 to 12 hours) before re-setting the steel manhole frames. Thin cracks were visible in the 2 to 3 inch layer of mortar placed on the EW-3 riser when the steel frame was set. The RA Subcontractor added additional concrete mortar around the outside of the original mortar on EW-3 to ensure stability of the cracked areas.

9.3 Backfill and Compaction Construction Deficiencies

All backfill was required per specifications to be placed and compacted in 12 inch even lifts up to the bottom of the 12-inch road gravel base layer and in 6 inch even lifts within the 12-inch road gravel base layer. The RA Subcontractor attempted to meet this requirement for the trench backfill, however, some of the backfill lifts were greater than 12 inches and lifts were uneven at times.

Truckloads of sand backfill material were dumped on the north and south ends of the trench area, and then placed in the trench by the excavator operator. Bucket loads of sand backfill were spread and leveled to a certain degree; however, operators were inconsistent in creating even lifts. Lift depths were estimated visually and not checked with a tape measure. The approach by the RA Subcontractor was to create backfill ramps on the north and south ends of the trench area, so that the trench could be accessed by a steel wheel roller as soon as possible. However, this approach may have created compaction lifts that were greater than one foot in depth near the north and south ends of the trench excavation and equal to or less than one foot near the center of the trench excavation.

9.4 Well Valve Vault Construction Deficiencies

Mastic was improperly placed in the joint between the well valve vault structure and lid structure, which resulted in water leakage into the vault rooms. Installation of the mastic in c older weather also did not allow the mastic to settle and seal sufficiently. The RA Contractor corrected this deficiency by applying sealant to the joint on the inside of the well valve vault.

9.5 Process Pipe Construction Deficiencies

Directional boring was conducted at a minimum depth of 4 feet for the majority of the boring. However, a small portion of the boring near the treatment unit was drilled at a depth less than 4 feet. This portion of piping was later partially unearthed and re-buried at the 4 foot depth to bring the piping into the treatment unit. Additional soil was also added to the surface of the piping run area to increase the pipe burial depth. After re-work of this portion of process piping, the minimum 4 foot depth requirement was met.

During pulling of the 2-inch HDPE pipe through the 4-inch pipe, a small gouge in the pipe was noticed about 80 feet into pulling the pipe. This gouge was big enough to affect the pressure strength of the pipe. The gouge appeared to be damage from a pallet jack or another type of heaving moving equipment. All 80 feet of the pipe was removed and double checked for nicks or scratches. The pipe was ok, but it was decided to feed the entire 500 foot roll of 2-inch pipe through the 4-inch pipe. The west end of the pipe will then be cut to the length need to attach to the treatment unit. The gouged section of pipe was discarded. The remaining portion of 2-inch HDPE pipe pulling was conducted slowly, and the 4-man crew that fed the pipe with their hands searched for any other damage to the pipe. No other damage was noted during this process.

During partial excavation of the 4-inch HDPE pipe near the treatment unit (in order to align the pipe to the treatment unit), a portion of the 4-inch HDPE pipe was damaged by the excavator bucket teeth. The damage was deemed significant enough that the 4-inch HDPE pipe had to be repaired. At the damaged area, a clean level cut was made in the 4-inch HDPE and the remaining pipe was removed from around the 2-inch HDPE. The piece of 4-inch HDPE removed was approximately 20 feet in length. A clean and level cut was also made on the removed piece of 4-inch HDPE and then the piece of HDPE was slid back onto the 2-inch HDPE and attached to the existing 4-inch HPDE double containment pipe using a 4-inch HDPE extra heavy Furnco coupler.

Section 10

Section 10
Area 4 Leachate RA Contact Information

A summary of the key Area 4 Leachate RA project personnel contacts is presented below.

Name	Title	Organization	Contact Information
Doyle Wilson	Remedial Project Manager	Illinois EPA	Bureau of Land 1021 N. Grand Ave East Springfield, Illinois 62794 217- 782-7592 Doyle.Wilson@illinois.gov
Tammy Mitchell	Community Involvement Coordinator	Illinois EPA	1021 N. Grand Ave East Springfield, Illinois 62794 217-524-2292 Tammy.Mitchell@Illinois.gov
Tim Drexler	Project Manager	U.S. EPA Region V	77 W. Jackson Blvd. Chicago, IL 60604-3590 312-353-4367 Drexler.timothy@epa.gov
Mike Joyce	Community Involvement Coordinator	U.S. EPA Region V	77 W. Jackson Blvd. Chicago, IL 60604-3590 312-353-5546 joyce.mike@epa.gov
John Grabs	Senior Project Manager	CDM	125 S. Wacker Drive Suite 600 Chicago, Illinois (312) 346-5000 grabsjc@cdm com
Troy McFate	Senior Project Manager	Bodine	5350 East Firehouse Rd. Decatur. Illinois 62521 217-519-3955 tmcfate@bodineservices.com

Section 11

Section 11
References

Bodine Environmental Services 2010. *Draft Sampling and Analysis Plan, Source Area 4 Remedial Action, SE Rockford Groundwater Contamination Superfund Site. October.*

Camp Dresser & McKee (CDM) 2010. *Southeast Rockford Groundwater Contamination Superfund Site, Source Area 4, Groundwater Management Zone Monitoring, Sampling and Analysis Plan.* September 14.

CDM 2007. *Technical Memorandum – Southeast Rockford Groundwater Contamination Superfund Site, Source Area 4 Phase II Pre-Design Aquifer Testing.* September 18.

CDM 2006. *Area 4 Remedial Action Revised Scope of Work.* June 28.

CDM 2004. *Southeast Rockford Groundwater Contamination Superfund Site Source Area 4 Field Study Technical Memorandum.* April 21.

CDM 1995. *Southeast Rockford Final Remedial Investigation Report.* January.

ENR 2011. *Construction Cost Index – Chicago.* McGraw-Hill Companies. On-Line Service Accessed on January 25.

Maple Leaf Environmental Equipment Ltd 2009. *Process Treatment System, Project #50570, Site: SE Rockford, Operation and Maintenance Manual.* Created June 27, 2006, Modified October 29.

United States Environmental Protection Agency (U.S. EPA) 2002. *EPA Superfund Record of Decision: Southeast Rockford Ground Water Contamination. EPA ID: ILD981000417. OU 03. Rockford, IL.* June 11.

U.S. EPA 2000. Close Out Procedures for National Priorities List Sites. EPA/540/R-98/016. OSWER Directive 9320.2-09A-P. January.

U.S. EPA 1998. Guide to Documenting and Managing Cost and Performance Information for Remediation Projects. October.

U.S. EPA 1995. *EPA Superfund Record of Decision: Southeast Rockford Ground Water Contamination. EPA ID: ILD981000417. OU 02. Rockford, IL.* September 29.

Appendix A
Construction Permits

City of Rockford, Illinois
Community & Economic Development Department
Construction and Development Services
425 East State Street, Rockford, IL 61104
Phone: 987-5550 Fax:(815)967-4243 TDD(815)987-5718
rockfordil.gov

THE CITY OF ROCKFORD ILLINOIS, USA

PERMIT

Multifamily/Commercial Permits - MC-New Commercial

Date Issued: 10/6/2009 2:19:49PM   Permit #: MULCOM20091671

PROPERTY INFORMATION

Address: 2665 SEWELL ST ROCKFORD, IL 61109   Pin #:
Lot: Sub Division: District:
Occupancy Type: U   Group Type: Utility, miscellaneous
Permit Type: Multifamily/Commercial Permits
Valuation: $ 850,000.00   Square Feet: 320.00

OWNER INFORMATION

Phone:

,

CONTRACTOR INFORMATION

Bodine Environmental Services, INC., Troy M. McFate   Phone:(217)519-3955
5350 East Firehouse Rd

Decatur IL, 62521

DESCRIPTION OF WORK

IEPA Groundwater Treatment Trailer - Pump groundwater from extraction wells in Marshall Street to treatment unit in the Right Of Way of Sewell Street. Plan Review 09-0905

FEES

Total Fees:$0.00   Total Paid:$0.00   Balance:$0.00

CONDITIONS

9/22/2009	9:18:26AM	PublWorks	rlundberg	Pass
9/22/2009	1:29:31PM	Building	ssommer	Pass

Permit is for new trailer/equipment pad for groundwater treatment. Call for footing inspection and final inspection. Separate permits are required for trade work (i.e. electrical).

9/22/2009	1:29:31PM	PlanZoning	balegria	Pass

construction of pump groundwater building (mobile) will be a minimum of 3' from leased property lines, ok per TC

9/22/2009	1:29:31PM	PublWorks	rlundberg	Pass

City of Rockford, Illinois
Community & Economic Development Department
Construction and Development Services
425 East State Street, Rockford, IL 61104
Phone: (815) 987-5550 Fax: (815) 967-4243 TDD (815) 987-5718
Web: www.rockfordil.gov

ROCKFORD

BUILDING PERMIT APPLICATION

Commercial, Industrial or Multifamily Dwelling Units

Plan Review #: Applicant to complete sections I-VIII (pages 1-3) App. #:

I. Project & Owner Information

Project Street Address: 2665 SEWELL STREET		P.I.N.	
Project Name: IEPA- SE ROCKFORD GROUNDWATER CONTAMINATION SA # 4 SUPERFUND SITE			
Owner's Name: ILLINOIS EPA	Phone: 815-233-1344	Fax	
Owner's Address: 1021 N. GRAND AVENUE EAST	City: SPRINGFIELD	State: IL	Zip: 62794

II. Type of Improvement & Construction Information

A. Type of improvement (check all that apply)

- ☒ New Building
- ☐ Foundation Only
- ☐ Addition
- ☐ Remodel/Alteration
- ☐ Repair
- ☐ Interior Demolition
- ☐ Change Of Use
- From ________
- To
- ☐ Relocation of Structure
- ☐ Temporary Struct. (>120sf & <180 days)

Existing Use: N/A

Proposed Use: GROUNDWATER TREATMENT TRAILER

Describe full scope of work: PUMP GROUNDWATER FROM EXTRACTION WELLS IN MARSHALL STREET TO TREATMENT UNIT IN THE RIGHT-OF-WAY OF SEWELL STREET - 2665 SEWELL STREET

B. Construction Type

- ☐ I-A Non-Combustible, Protected
- ☐ II-A Non-Combustible, Protected
- ☐ III-A Non-Combustible Exterior, Protected
- ☐ IV Heavy Timber
- ☐ V-A Combustible, Protected
- ☐ I-B Non-Combustible, Protected
- ☐ II-B Non-Combustible, Unprotected
- ☐ III-B Non-Combustible Exterior, Unprotected
- ☒ V-B Combustible, Unprotected

C. Use Group / Occupancy Type

- ☐ A-1 Assembly Theaters, With Stage
- ☐ A-1 Assembly Theaters, Without Stage
- ☐ A-2 Assembly, Nightclubs
- ☐ A-2 Assembly, Restaurants, Bars, Banquet Halls
- ☐ A-3 Assembly, Religious
- ☐ A-3 Assembly, General Com. Halls, Libraries, Museums
- ☐ A-4 Assembly, Arenas
- ☐ B Business
- ☐ E Educational
- ☐ F-1 Factory & Industrial, Moderate Hazard
- ☐ F-2 Factory & Industrial, Low Hazard
- ☐ H-1 High Hazard, Explosives
- ☐ H-234 High Hazard
- ☐ H-5 HPM
- ☐ I-1 Institutional, Supervised
- ☐ I-2 Institutional, Hospitals
- ☐ I-2 Institutional, Nursing Homes
- ☐ I-3 Institutional, Restrained
- ☐ I-4 Institutional, Daycare
- ☐ M Mercantile (Retail)
- ☐ R-1 Residential, Hotels
- ☐ R-2 Residential, Multi-Family Specify # Units____
- ☐ R-3 Residential, Townhomes Specify # Units____
- ☐ R-4 Residential, Care/Assisted Living Facilities (6-16 Occ)
- ☐ S-1 Storage, Moderate Hazard
- ☐ S-2 Storage, Low Hazard
- ☒ U Utility, Miscellaneous

D. Building Height & Floor Areas

Grade at Entrance to Top of Highest Roof: 8 ft 6 in

Building Width: 8 ft Length: 40 ft

Basement? ☐ Yes ☒ No

Number of Stories Above Grade: 1

Floor Area Square Feet (sf)	Existing	Remodel/Alteration	New / Addition	TOTAL per floor
Basement				
1st Floor			320	320
2nd Floor				
Mezz./Other				
			TOTAL ALL FLOORS	320

III. Construction Valuation

Total Cost of Project (ALL TRADES) (Labor, Materials Overhead & Profit): $ 850,000.00

Expected Start Date: 10/5/2009

Expected Completion Date: 11/15/2009

IV. Designated Responsible Party for Payment of Permit Fee

Role in Project (i.e. general contractor, owner, etc.)	GENERAL CONTRACTOR
Name: TROY M. McFATE	Company: BODINE ENVIRONMENTAL SERVICES

V. Deferred Submittals

Is project to be submitted in phases? ☐ Yes ☒ No

If **Yes**, designate the Design Professional in Responsible Charge (DPRC). The DPRC shall review the deferred submittals and forward them to the Code Official with a notation indicating that the documents have been reviewed and been found to be in general conformance with the building design. (i.e. MEP dwgs)

A. Design Professional in Responsible Charge (DPRC)

Name		Company
Phone	Fax	Email

VI. Construction Documents

A. Architect

Architect of Record: WENDELL YANG		Company: CAMP DRESSER & McKEE		
Address: 125 S. WACKER DR., STE. 600		City: CHICAGO	State: IL	Zip: 60606
Phone: 312-346-5000	Fax: 312-346-5228	Email: YANGWW@CDM.COM		

B. Others

Structural Engineer	Phone	Email or Fax
Mechanical Engineer	Phone	Email or Fax
Electrical Engineer	Phone	Email or Fax
Plumbing Engineer/Designer	Phone	Email or Fax
Fire Suppression Engineer	Phone	Email or Fax
Fire Alarm Engineer	Phone	Email or Fax
Civil Engineer	Phone	Email or Fax

VII. Contractors

A. General Contractor

Contact Person: TROY McFATE		Company: BODINE ENVIRONMENTAL SERVICES, INC.		
Address: 5350 E. FIREHOUSE RD.		City: DECATUR	State: IL	Zip: 62521
Phone: 217-519-3955	Fax: 217-864-2086	Email: tmcfate@bodineservices.com		

B. Mechanical Contractor (City License and Separate Permit Required)

Contractor: MIDWEST MECHANICAL SERVICES	Phone: 815-234-8200	License #: 035711

C. Refrigeration Contractor (City License and Separate Permit Required)

Contractor	Phone	License #

D. Electrical Contractor (City Registration and Separate Permit Required)

Contractor: MORSE ELECTRIC	Phone: 815-266-4285	Registration #: EC065750-22

E. Plumbing Contractor (State License and Separate Permit Required)

Contractor	Phone	License #

F. Fire Sprinkler Contractor (State License and Separate Permit Required)

Contractor	Phone	License #

G. Fire Alarm Contractor (City Registration and Separate Permit Required if NOT Electrical Contractor Above)

Contractor	Phone	License #

APPLICANT'S CERTIFICATE

Must be completed, signed and dated for permit to be processed.

VIII. Applicant's Certificate			
As owner or authorized agent of the project for which this application is being filed, I hereby certify: 1. The description of use and information contained on this application is correct and; 2. The structure will not be occupied or used until all known code violations are corrected and a Certificate of Occupancy is issued by the Building Department and; 3. The project, if permit is granted, will comply with all requirements of applicable City Ordinances and pay all fees required by such ordinances and; 4. The project will be constructed in accordance with the released documents [drawings and specifications] and applicable codes and ordinances of the City of Rockford and; 5. Any changes to the released documents will be filed with the City of Rockford Building Department and; 6. Another application will be submitted at such time as the described use may change. 7. No error or omission in either documents or application, whether said documents or application have been approved by the Code Official or not, shall permit or relieve the applicant from constructing the work in any manner other than provided for in the Ordinances of this City relating thereto. 8. If other than the owner, I am certifying that the proposed work has been authorized by the owner of record and that I have been authorized by the owner to complete this application on his behalf. I will be acting on the behalf of the owner as his: ☐ **Architect** ☐ **Engineer** ☒ **Contractor** ☐ **Agent** ☐ **Other**________			
Name ☐ (Check If Owner) TROY M. MC FATE	Title PROJECT MANAGER		
Company BODINE ENVIRONMENTAL SERVICES, INC.	Phone 217-519-3955		
Street Address 5350 E. FIREHOUSE RD.	City DECATUR	State IL	Zip 62521
Signature X [signature]		Date 9-9-2009	

City of Rockford, Illinois
Community & Economic Development Department
Construction and Development Services
425 East State Street, Rockford, IL 61104
Phone: (815) 987-5550 Fax: (815) 967-4243 TDD (815) 987-5718
Web www.rockfordil.gov

Building Code Section Clearance Form

(To be completed by Staff)

PERMIT IS SUBJECT TO THE FOLLOWING COMMENTS

☐ Permit holder(s) shall call for all inspections – see attached inspection list.

☐ A separate permit is required for electrical/fire alarm work and shall be performed by a *Registered Electrician.*
☐ *Construction Documents* shall be submitted for electrical/fire alarm work before an electrical permit is issued.

☐ A separate permit is required for plumbing work and shall be performed by an *IL Licensed Plumbing Contractor.*
☐ *Construction documents* shall be submitted for plumbing work before a plumbing permit is issued.

☐ A separate permit is required for mechanical work and shall be performed by a *Licensed Mechanical Contractor.*
☐ *Construction documents* shall be submitted for mechanical work before a permit is issued.

☐ A separate permit is required for refrigeration work and shall be performed by a *Licensed Refrigeration Contractor.*
☐ *Construction documents* shall be submitted for refrigeration work before a refrigeration permit is issued.

☐ A separate permit is required for fire suppression work.
☐ *Construction documents* shall be submitted for fire suppression work before a permit is issued.

☐ See plan review # ______________ and response letter(s) from the designer. ______________________________

____
____
____
____
____
____

Building Permit #: ______________________
Foundation Permit #: ______________________
Other Partial Permit #: ______________________
Other Partial Permit #: ______________________

Approved By: ______________________
Date: ______________________

Plan Review Fees:	(see fee schedule for rates)
Foundation	$
Building	$
Mechanical	$
Electrical	$
Plumbing	$
Fire Suppression	$

(SF) X =

Building Permit Fee	$
Processing Fee	$
Subtotal	$
Tech Fee	$
Total Fees:	$

[Invoice No ______________________]

City of Rockford, Illinois
Community & Economic Development Department
Construction and Development Services
425 East State Street, Rockford, IL 61104
Phone: (815) 987-5550 Fax: (815) 967-4243 TDD (815) 987-5718
Web: www.rockfordil.gov

Planning & Zoning Clearance Form

(To be completed by Staff) App. #:

Project Information

Project Address	
P.I.N. #	**Zoning District**

Site Plan Review

Is there a Special Use Permit? ☐ Yes ☐ No

Were Variations Granted? ☐ Yes ☐ No File No.________ Date:________

Does the Liquor Advisory Board (L.A.B.) Process Apply? ☐ Yes ☐ No File No.________ Date:________

Required Setbacks (feet) North: ________ East: ________ South: ________ West: ________

Proposed Setbacks (feet) North: ________ East: ________ South: ________ West: ________

Building Height (grade at front door to highest roof, or mechanical or architectural appurtenance): ____________feet

Is the height of the structure under allowable limits? ☐ Yes ☐ Existing ☐ No

Is a Site Illumination Plan Required? ☐ Yes ☐ Shown ☐ No ☐ Not Shown

Is a Trash Dumpster Enclosure Required? ☐ Yes ☐ Shown ☐ No ☐ Not Shown

Is Sanitary Sewer Required? ☐ Yes ☐ Existing ☐ No

Is City Water Required? ☐ Yes ☐ Existing ☐ No

Are Public Sidewalks Required? ☐ Yes ☐ Existing ☐ No

Is Off-Street Parking Required? ☐ Yes ☐ No ☐ Existing

Required Provided

Do the Following Apply?

Is the property located in the Enterprise Zone? ☐ Yes ☐ No

Does the Historic Preservation Ordinance apply? ☐ Yes ☐ No

Is a Public Works Dept. Clearance Required? ☐ Yes ☐ No

Staff Comments

____

____

____

____

____

____

Paving ____

Landscaping: ____

ALL REQUIRED PAVING, SIDEWALK AND LANDSCAPING MUST BE COMPLETED PRIOR TO ISSUANCE OF THE CERTIFICATE OF OCCUPANCY.

Zoning Clearance #:____________________

Zoning Clearance By:____________________

Date:____________________

Review Fee $____________

Other Fee $____________

Total Fees: $____________

[Invoice No.]

Excellence Everywhere

W6

THE CITY OF ROCKFORD ILLINOIS USA

Jon Hollander, PE
City Engineer
Public Works Department

RIGHT OF WAY PERMIT APPLICATION

(To tunnel, bore, excavate, dig or other such work in City street, alley, sidewalk, terrace or other public right-of-way)

8-11-2009
(DATE OF APPLICATION)

PERMIT# ROW2009|954

BODINE ENVIRONMENTAL SERVICES
(APPLICANT NAME) (PLEASE PRINT)

PACKARD EXCAVATING
(IF BUILT BY A CONTRACTOR-GIVE NAME)

☐ UTILITY COMPANY OR ☒ CONTRACTOR OR ☐ HOMEOWNER
(IS APPLICANT) (CHECK ONE BOX)

5454 FOREST HILLS CT, LOVES PARK, IL 6111
(ADDRESS)

5350 E. FIREHOUSE RD., DECATUR, IL. 62521
(APPLICANT ADDRESS) (PLEASE PRINT)

815-633-9419
(PHONE) (FAX)

217-519-3955
(PHONE)

(APPLICANT SIGNATURE)

SE ROCKFORD SOURCE AREA #4 SUPERFUND SITE

The above applicant hereby agrees to perform the work in accordance with the provisions and as set forth in Chapter 26 as revised, of the City of Rockford, Code of Ordinance. Traffic control will be in accordance with Chap. P of the Illinois Highway Standards Manual.

INSTALL 2" HDPE PIPING & ELECTRICAL TO WELL VAULT FROM EXTRACT. WELLS IN MARSHALL STREET
(DESCRIPTION OF WORK) (EXAMPLES, BURY 125' OF 4" GAS MAIN; ACCESS MANHOLE; CUT ROAD TO INSTALL SEWER/WATER SERVICE, ETC.)

2630 MARSHALL ST. / WORK WILL BE COMPLETED IN MARSHALL ST.
(LOCATION OF WORK - HOUSE ADDRESS & STREET NAME)

☒ PAVEMENT ☐ ALLEY ☐ SIDEWALK ☐ TERRACE ☐ CURB

TYPE OF PAVEMENT ☐ CONCRETE ☒ ASPHALT ☐ BRICK

MARSHALL ST. BETWEEN HARRISON & ALTON AVE.
(WORK IS LOCATED BETWEEN THESE TWO SIDE STREETS)

8/17/09 THRU 9/4/09
(DATE WORK WILL BE DONE)

7:00 a.m. 5:00 p.m
(ESTIMATED WORK HOURS)

☒ YES ☐ NO
(WILL TRAFFIC CONTROL BE PROVIDED?)

PAVEMENT WILL BE SAWCUT & REPAIRED (APPROX. 100' x 20')
(IF CUTTING OR DIGGING IN PAVEMENT GIVE DIMENSIONS OF CUT)

☒ NO ☐ YES IF YES, SEE NOTE BELOW
(HAS STREET BEEN PAVED IN THE LAST 5 YEARS?)

(ALL CURBS MUST BE SAW CUT. IF UPON INSPECTION THE CURB IS FOUND TO HAVE BE BROKEN, REMOVAL OF APPROACH, PROPER CURB CUT AND REINSTALLATION OF APPROACH WILL BE MADE BY CONTRACTOR AT NO COST TO THE CITY OF ROCKFORD. TEMPERARY REPAIR MUST BE FOLLOWED BY PERMANENT REPAIR.)

NOTE: EXCAVATING, CUTTING OR DIGGING OF CITY STREETS IS PROHIBITED FOR FIVE YEARS AFTER PAVING UNLESS WORK IS AN EMERGENCY AND THEN ONLY BY PERMISSION OF CITY ENGINEER.

PLEASE USE THE DRAWING ON THE BACK OF THIS FORM TO SHOW YOUR WORK.

PROOF OF INSURANCE AND BOND WITH CITY REQUIRED
ONE & TWO FAMILY CONSTRUCTION: $ 20
MULTI-FAMILY (BEYOND 1 & 2 FAMILY): $ 20 + $ 3.00 PER FOOT OF CURB CUT
COMMERCIAL & INDUSTRIAL: $ 20 + $ 3.00 PER FOOT OF CURB CUT
($20 inspection fee; waived for Public Utility Companies)

8.12.09 $

(INTERNAL PAY CODE 1010 61403)
(APPROVED BY) (PUBLIC WORKS DEPT.) (DATE OF APPROVAL) (FEE)

Appendix B
Test Reports

DATE: 11-May-07

Bituminous Mixture Design

Design Number : ———>		00BIT1031	
Lab preparing the design ? (PP,PL,IL,etc)		PP	
Producer Number & Name -->	1686-25	RBT	@ NIMTZ Quarry <--- Plant Location
Material Code Number -->	19514R	HMA N50 REC SURFACE 905 mm D	

0

82BIT2292

19514R N50 REC SURFACE 9.5 D

Agg No.	#1	#2	#3	#4	#5	MF	RAP	ASPHALT	
Size	032CM16			038FM20	037FM01	004MF02	017CM16	10125	PG 58 - 22
Source (PROD #)	52012-69			52012-69	52010-14	1686-25	1686-25	1757-05	
(NAME)	R S & G			R S & G	R S & G	RBT	RBT	SENECA	
(LOC)	NIMTZ C			NIMTZ Q	N. Shore	NIMTZ	NIMTZ	LEMONT	
(ADD. INFO)	109-170' Grey			109-170' Grey	Below Water		2006 - 2007		
						RAP % -->	15.0		
Aggregate Blend:						AC in RAP -->	5.4		
	58.5	0.0	0.0	12.5	12.5	1.5	15.0	100.0	

IDOT Verification, Lab # 00BIT1031

MD Prepared By RBT ; Lab #"07RBT0002"

Agg No. / Sieve Size	#1	#2	#3	#4	#5	MF	RAP	Aggregate Blend
1" (25.0mm)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3/4" (19.0mm)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1/2" (12.5mm)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3/8" (9.5mm)	94.0	100.0	100.0	100.0	100.0	100.0	96.0	95.9
No.4 (4.75mm)	35.0	100.0	100.0	100.0	98.0	100.0	67.0	56.8
No.8 (2.36mm)	4.0	100.0	100.0	86.0	89.0	100.0	44.0	32.3
No.16 (1.18mm)	3.0	100.0	100.0	53.0	81.0	100.0	32.0	24.8
No.30 (600μm)	2.8	100.0	100.0	32.0	61.0	100.0	24.0	18.4
No.50 (300μm)	2.6	100.0	100.0	18.0	13.0	100.0	17.0	9.4
No.100 (150μm)	2.5	100.0	100.0	8.0	2.0	95.0	13.0	6.1
No.200(75μm)	2.4	100.0	100.0	4.1	0.2	85.0	9.0	4.6

Mixture Composition Specification		FORMULA	FORMULA RANGE Min	Max
		100		
		100		
100		100		
90-100		96		
28-65		57	52	62
28-48		32	27	37
10-32		25		
		18		
4-15		9	5	13
3-10		6		
4-6		4.6	3.1	6.1

	#1	#2	#3	#4	#5	MF	RAP	Aggregate Blend	
Bulk Sp Gr	2.514	1.000	1.000	2.640	2.610	2.750	2.660	2.625	
Apparent Sp Gr	2.809	1.000	1.000	2.776	2.679	2.750	2.760	2.780	Dust/AC
Absorption, %	2.70	1.00	1.00	1.70	1.00	1.00	1.00	1.72	Ratio
							SP GR AC	1.032	0.77

AMOUNT OF AGED RAP AC 0.81

VIRGIN AC 5.1

SUMMARY OF SUPERPAVE GYRATORY DESIGN DATA

BITUMINOUS MIXTURE AGED 1 HOURS @ 300 F

DATA for N-int.	6								
	AC, %MIX	(Gmb)	(Gmm)	(Pa)	VMA	VFA	Vbe	Pbe	Pba
MIX 1	5.5	2.147	2.499	14.1	22.7	38.1	8.65	4.16	1.42
MIX 2	6.0	2.170	2.483	12.6	22.3	43.4	9.69	4.61	1.48
MIX 3	6.5	2.171	2.463	11.9	22.7	47.7	10.82	5.14	1.45
MIX 4	7.0	2.193	2.455	10.7	22.3	52.3	11.66	5.49	1.63

DATA for N-des.	50									
		(Gmb)	(Gmm)	(Pa)	VMA	VFA	Vbe	Pbe	Gse	Pba
MIX 1	5.5	2.368	2.499	5.2	14.8	64.6	9.54	4.16	2.724	1.42
MIX 2	6.0	2.391	2.483	3.7	14.4	74.1	10.68	4.61	2.728	1.48
MIX 3	6.5	2.399	2.463	2.6	14.6	82.2	11.96	5.14	2.726	1.45
MIX 4	7.0	2.422	2.455	1.3	14.2	90.7	12.88	5.49	2.739	1.63

	NUMBER OF GYRATIONS	%AC	Gmb	Gmm	%VOIDS (Pa)	VMA	VFA	Gse	Gsb	TSR
		5.91			Target					
OPTIMUM DESIGN DATA @Ndes: --->	50	5.9	2.387	2.486	4.0	14.5	72.4	2.728	2.625	0.89

REMARKS: MFR = .8%; May Require Use of Plant Dust Loss System

Tested by : ____________________

Reviewed by : ____________________

Final Approval : ____________________

DATE: 18-May-07

Bituminous Mixture Design

Design Number : ———> 00BIT1036

Lab preparing the design ? (PP,FL,AL,etc) PP

Producer Number & Name ->	1686-25	ROCKFORD BLACKTOP	@ NIMTZ QUARRY	<— Plant Location
Material Code Number -- >	19512R	HMA N50 REC BINDER CSE 19.0 mm		

0

Agg No.	#1	#2	#3	#4	#5	MF	RAP	ASPHALT	
Size	042CM11	032CM16		038FM20	037FM01	004MF02	017CM16	10125	PG 58 -22
Source (PROD #)	52012-69	52012-69		52012-69	52010-14	1686-25	1686-25	1757-05	
(NAME)	R S & G	R S & G		R S & G	R S & G	RBT	RBT	SENECA	
(LOC)	NIMTZ Q	NIMTZ Q		NIMTZ Q	N. Shore P	NIMTZ Q	NIMTZ Q	LEMONT	
(ADD. INFO)	109-170' Grey	109-170' Grey		109-170' Grey	Below Water		2006-2007		
						RAP % -->	20.0		
						AC in RAP -->	5.4		
Aggregate Blend:	27.0	36.0	0.0	8.0	8.0	1.0	20.0	100.0	

82BIT2289

19512R N50 REC BINDER CSE 19.0

Agg No. Sieve Size	#1	#2	#3	#4	#5	MF	RAP	Aggregate Blend
1" (25.0mm)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3/4"(19.0mm)	73.0	100.0	100.0	100.0	100.0	100.0	100.0	92.7
1/2" (12.5mm)	23.0	100.0	100.0	100.0	100.0	100.0	100.0	79.2
3/8" (9.5mm)	8.0	94.0	100.0	100.0	100.0	100.0	96.0	72.2
No.4 (4.75mm)	4.0	35.0	100.0	100.0	98.0	100.0	67.0	43.9
No.8 (2.36mm)	3.0	4.0	100.0	86.0	89.0	100.0	44.0	26.1
No.16 (1.18mm)	3.0	3.0	100.0	53.0	81.0	100.0	32.0	20.0
No.30 (600µm)	2.8	2.8	100.0	32.0	61.0	100.0	24.0	15.0
No.50 (300µm)	2.6	2.6	100.0	18.0	13.0	100.0	17.0	8.5
No.100 (150µm)	2.5	2.5	100.0	8.0	2.0	95.0	13.0	5.9
No.200(75µm)	2.4	2.4	100.0	4.1	0.2	85.0	9.0	4.5

IDOT Verification, Lab # 00BIT1036

MD Prepared By RBT ; Lab #"07RBT07RBT0003"

Mixture Composition Specification		FORMULA	FORMULA RANGE Min	Max
100		100		
82-100		93		
50-85		79	73	85
		72		
24-50		44	39	49
20-36		26	21	31
10-25		20		
		15		
4-12		9	5	13
3-9		6		
3-6		4.5	3.0	6.0

	#1	#2	#3	#4	#5	MF	RAP	Aggregate Blend	
Bulk Sp Gr	2.607	2.614	1.000	2.640	2.610	2.750	2.660	2.624	
Apparent Sp Gr	2.795	2.809	1.000	2.776	2.679	2.750	2.760	2.781	Dust/AC
Absorption, %	*2.60*	*2.70*	*1.00*	*1.70*	*1.00*	*1.00*	*1.00*	*1.74*	Ratio
							SP GR AC	1.032	0.95

AMOUNT OF AGED RAP AC 1.08

VIRGIN AC 4.2

SUMMARY OF SUPERPAVE GYRATORY DESIGN DATA

BITUMINOUS MIXTURE AGED 1 HOURS @ 300 F

DATA for N-int.	6								
	AC, %MD	(Gmb)	(Gmm)	(Pa)	VMA	VFA	Vbe	Pbe	Pba
MIX 1	4.5	2.165	2.538	14.7	21.2	30.8	6.52	3.11	1.46
MIX 2	5.0	2.172	2.515	13.7	21.4	36.2	7.73	3.68	1.39
MIX 3	5.5	2.195	2.504	12.3	21.0	41.1	8.63	4.06	1.53
MIX 4	6.0	2.195	2.491	11.9	21.4	44.4	9.49	4.46	1.64

DATA for N-des.	50									
		(Gmb)	(Gmm)	(Pa)	VMA	VFA	Vbe	Pbe	Gse	Pba
MIX 1	4.5	2.383	2.538	6.1	13.3	54.1	7.18	3.11	2.725	1.46
MIX 2	5.0	2.394	2.515	4.8	13.3	64.0	8.53	3.68	2.721	1.39
MIX 3	5.5	2.417	2.504	3.5	13.0	73.3	9.50	4.06	2.730	1.53
MIX 4	6.0	2.419	2.491	2.9	13.3	78.4	10.46	4.46	2.738	1.64

	NUMBER OF GYRATIONS	%AC	Gmb	Gmm	%VOIDS (Pa) Target	VMA	VFA	Gse	Gsb	TSR
		5.30								
OPTIMUM DESIGN DATA @Ndes: --->	50	5.3	2.408	2.508	4.0	13.1	69.5	2.726	2.624	0.80

REMARKS: MFR = 0.5%

Tested by : ____________________

Reviewed by : ____________________

Final Approval : ____________________

Report Date: 11/05/2009

CONCRETE INSPECTION REPORT

TESTING SERVICE CORPORATION

2235 23rd Avenue, Rockford, IL 61104 Phone 815.394.2562 Fax 815.394.2566

Client: Bodine Environmental Services
5350 East Firehouse Road
Decatur, IL 62521
Attn: Mr. Troy McFate

Project: Southeast Rockford Source Area 4
2630 Marshall Street
Rockford, Illinois

Date of Pour:	October 8, 2009	TSC Project Number:	L-73,968
Sampled by:	A. Hendricks-TSC	Supplier:	Rogers Ready Mix & Materials
Concrete Mixture Designation:	121		Rockford, Illinois

Design Strength (PSI): 3000
Design Air Content (%): 3.5 - 5
Design Slump Range (inches): 4 Max.

RECEIVED NOV - 9 2009

FIELD DATA

Location of Placement: Footings

Slump (inches):	2	Time Batched:	10:44 am
Air Content	3.7	Time Placement Begins:	
Unit Weight (PCF):		Time Tested:	
Concrete Temp. (°F)	64	Time Placement Ends:	
Weather:	50	Water Added:	3 gallons
Total Cubic Yards Placed:	3	Other Admixtures:	
Ticket No.	62198	Specimen Type:	6"x12" cylinder
Truck No./Load No.	65/1	Area (Sq. in.):	28.27

Specimen	Test Age Days	Total Force (Pounds)	Compressive Strength (PSI)	Type of Fracture
13076	7	120,710	4,270	SHEAR
13077	14	148,250	5,250	SHEAR
13078	28	166,900	5,910	SHEAR
13079	28	163,390	5,790	SHEAR

Remarks:
cc:

Authorized Signature

Lot Number: L125-08-368 **Net Wt:** 50 LBS
Date Tested: 2/09

	Purity	Germ	Origin
Rival™ Brand** Annual Ryegrass:	34.00 %	90 %	OR
Tonga Tetraploid Perennial Ryegrass:	*33.87 %	90 %	OR
DUO Festulolium:	31.00 %	90 %	OR
Other Crop:	.12 %		
Inert Matter:	.90 %		
Weed Seed:	.11 %		

Noxious Weeds: None Found

*Purity determined by growout test.
**Variety Not Stated

THE DELONG COMPANY
PO Box 552
CLINTON, WI 53525

AMS# 578

Report for Illinois Department of Transportation

AGGREGATE GRADATION REPORT

MISTIC ID

Report By:
Company:

Inspector No.:	920000000	Name:	Nick Hailey	Date Sampled:	082509	Seq No:	001	
Mix Plant No.:		Name:				Contract No:		Job No.:
Responsible Loc:	92	Lab:	PP	Lab Name:	Wc Construction	Source Name:	Mulford	

SOURCE	MATL CODE	TYPE INSP	ORIGINAL ID	SPECIFICATION	SAMPLED FROM	WASH DRY	Load Out / Terminal
52012-77	**022CM07**	**PRO**			**SP**	**W**	

SIEVE IN	3	2.5	2	1.75	1.5	1	3/4	5/8	1/2	3/8	#4	#8	#16	#30	#40	#50	#100	#200
MM	75	63	50	45	37.5	25	19	15.9	12.5	9.5	4.75	2.36	1.18	.6	.425	.3	.15	.075
PASS %					**100**	**94**	**61**	**45**	**30**	**10**	**3**		**3**					**1.8**

WASH 200	RESULT	REMARK
1.5	**APPR**	**Sewer Bedding**

SIEVE English	SIEVE Metric	Indiv. Wt. Retained	Accum Weights	Accum Passing	Pct Passing	Spec Min	Spec Max	Out Flag	Rounded Passing
3	75								
2.5	63								
2	50								
1.75	45								
1.5	37.5				**100.0**	100	100		100
1	25	303.0	303.0	5.7	**94.3**	90	100		94
3/4	19	1789.1	2092.1	39.5	**60.5**				61
5/8	15.9	800.0	2892.1	54.6	**45.4**				45
1/2	12.5	800.0	3692.1	69.8	**30.2**	30	46		30
3/8	9.5	1060.2	4752.3	89.8	**10.2**				10
1/4	6.3	390.0	5142.3	97.2	**2.8**				3
#4	4.75	6.7	5149.0	97.3	**2.7**	0	10		3
#8	2.36								
#10	2								
#16	1.18	14.1	5163.1	97.5	**2.5**				3
#30	0.6								
#40	0.425								
#50	0.3								
#80	0.18								
#100	0.15								
#200	0.075	34.8	5197.9	98.2	**1.8**				1.8
Pan		11.8							
Tot Dry Wt.		5293.1		Wash %	1.48				
Tot Wash Wt		5215.0							
Diff (-.075)		78.1							

Orig. Wet Weight: 5452.3 Moisture %: 3.01

(#200 / #40):

% Washed -200: 1.48

(Mix Plant Only)

Lot:

Bin:

Tech/Insp: Nick Hailey

Tested By: Nick Hailey

Agency: Wc Construction

Copies to:

Validity Check OK

Report Date: August 26, 2009
/FOR DTY03504
MI504QC Excel Verison 6.0-01.01.09

(This is a Field/Laboratory Report for MISTIC Input)

Report for Illinois Department of Transportation

MISTIC ID

Report By:
Company:

AGGREGATE GRADATION REPORT

Inspector No.:	920000000	Name:	Meghan Ross	Date Sampled:	08/27/07	Seq No:	001
Mix Plant No.:		Name				Contract No:	Job No.
Responsible Loc.	92	Lab:	PP	Lab Name:	Rockford S&G	Source Name:	Mulford

SOURCE	MATL CODE	TYPE INSP	ORIGINAL ID	SPEC	ART	SAMPLED FROM	WASH DRY
52012-77	01FA06	PRO				PR	W

SIEVE IN / MM		1 / 25	3/8 / 9.5	#4 / 4.75	#8 / 2.36	#10 / 2.0	#16 / 1.18	#30 / .6	#40 / .425	#50 / .3		#80 / .18			#100 / .15		#200 / .075
PASS %			95	74	54		41								20		13.1

WASH 200	RESULT	REMARK
11.7	FAIL	

SIEVE English	SIEVE Metric	Indiv Wt. Retained	Accum Weights	Accum Passing	Pct Passing	Spec Min	Spec Max	Out Flag	Rounded Passing
3	75								
2.5	63								
2	50								
1.75	45								
1.5	37.5								
1	25								
3/4	19								
5/8	15.9								
1/2	12.5	7.8	7.8	0.4	99.6	100	100	IN	100
3/8	9.5	83.1	90.9	5.0	95.0				95
1/4	6.3								
#4	4.75	382.6	473.5	25.9	74.1	50	100	IN	74
#8	2.36	365.0	838.5	45.9	54.1				54
#10	2								
#16	1.18	237.7	1076.2	59.0	41.0				41
#30	0.6								
#40	0.425								
#50	0.3								
#80	0.18								
#100	0.15	378.4	1454.6	79.7	20.3	0	40	IN	20
#200	0.075	132.2	1586.8	86.9	13.1	0	12	OUT	13.1
Pan		23.6							
Tot Dry Wt.		1825.4							
Tot Wash Wt		1611.9							
Diff (-.075)		213.5							

Wash % 11.70

Orig. Wet Weight: 1944 Moisture %: 6.4972

(#200 / #40):

% Washed -200: 11.69607

(Mix Plant Only)

Lot:

Bin:

Tech/Insp: Meghan Ross
Signature:
Tested By: Meghan Ross
Signature:
Agency: Rockford S&G

Copies to: IDOT
Rockford S&G

Validity Check OK

Report Date: August 28, 2007
FOR DTY93504
MI504QC Excel Verison 3.1 04.14.04

(This is a Field/Laboratory Report for MISTIC Input)

Report for Illinois Department of Transportation

MISTIC ID

AGGREGATE GRADATION REPORT

Report By:
Company:

Inspector No.:	920000000	Name:	Meghan Ross	Date Sampled:	06/ 1/07	Seq No:	SPLIT
Mix Plant No.:		Name:				Contract No.	Job No.
Responsible Loc:	92	Lab:	PP	Lab Name:	Rockford S&G	Source Name:	Mulford

SOURCE	MATL CODE	TYPE INSP	ORIGINAL ID	SPEC	ART	SAMPLED FROM	WASH DRY
52012-77	032CA06	PRO				PR	W

SIEVE IN / MM	3 / 75	2.5 / 63	2 / 50	1.75 / 45	1.5 / 37.5	1 / 25	3/4 / 19	5/8 / 15.9	1/2 / 12.5	3/8 / 9.5	#4 / 4.75	#8 / 2.36	#16 / 1.18	#30 / .6	#40 / .425	#50 / .3	#100 / .15	#200 / .075
PASS %					100	98	91		74	64	44		24		18			11.2

WASH 200	RESULT	REMARK
6.9	APPR	

SIEVE English	SIEVE Metric	Indiv. Wt. Retained	Accum Weights	Accum Passing	Pct Passing	Spec Min	Spec Max	Out Flag	Rounded Passing
3	75								
2.5	63								
2	50								
1.75	45								
1.5	37.5	0			100.0	100	100	IN	100
1	25	99.1	99.1	1.7	98.3	90	100	IN	98
3/4	19	451.7	550.8	9.4	90.6				91
5/8	15.9								
1/2	12.5	992.6	1543.4	26.4	73.6	60	90	IN	74
3/8	9.5	558.5	2101.9	36.0	64.0				64
1/4	6.3								
#4	4.75	1142.6	3244.5	55.6	44.4	30	56	IN	44
#8	2.36								
#10	2								
#16	1.18	1192.0	4436.5	76.0	24.0	10	40	IN	24
#30	0.6								
#40	0.425	374.4	4810.9	82.4	17.6				18
#50	0.3								
#80	0.18								
#100	0.15								
#200	0.075	373.2	5184.1	88.8	11.2	4	12	IN	11.2
Pan		250.8							
Tot Dry Wt.		5837.7		Wash %	6.26				
Tot Wash Wt		5437.1							
Diff (-.075)		400.6							

Orig. Wet Weight: 6107.3 Moisture %: 4.6183

(#200 / #40): 0.6364

% Washed -200: 6.862292

(Mix Plant Only)

Lot:

Bin:

Tech/Insp: Meghan Ross
Signature: ____________________
Tested By: Meghan Ross
Signature: ____________________
Agency: Rockford S&G

Copies to: IDOT
Rockford S&G

Validity Check OK

Report Date: June 12, 2007
/FOR DTY03504
MI504QC Excel Version 3.1 04.14.04

(This is a Field/Laboratory Report for MISTIC input)

TSC
TESTING SERVICE CORPORATION
Local Offices:
2235 23rd Avenue, Rockford, IL 61104-7334
815.394.2562 • Fax 815.394.2566

Rockford, Illinois

October 22, 2009

Mr. Troy McFate
Bodine Environmental Services
5350 East Firehouse Road
Decatur, Illinois 62521

Re: L-73,968
Laboratory Testing of Topsoil Sample
Southeast Rockford Source Area 4
2630 Marshall Street
Rockford, Illinois

Dear Mr. McFate:

A sample of topsoil was obtained by you for laboratory testing. The sample was delivered to Testing Service Corporation's Rockford office by you on September 17, 2009 and subsequently delivered to our laboratory in Carol Stream for testing. Tests performed on the sample of topsoil (Vegetative Soil as noted in the project specification) consisted of pH and organic content by Loss-on-Ignition (L.O.I.) in accordance with AASHTO T267. The results of the lab tests, as well as the appropriate specification limits for each as provided to us by you, are shown in the table below.

Sample Date	**Soil Description**	**Sample pH**	**pH Specification Limits**	**Sample Organic Content by L.O.I.**	**Organic Content by L.O.I. Specification Limits**
9/17/09	Dk. brown sandy, silty TOPSOIL (OL)	7.26	5.5 to 6.5	5.5%	4% to 6%

It has been a pleasure to assist you with this work. Please call if there are any questions or if we may be of further service.

Appendix C
As-Built Documentation

- Soil Boring Logs and Extraction Well Construction Details
- Extraction Well Components
- Well Valve Vault
- Site Plan
- Treatment Unit Layout
- O&M Schedule
- Operations Log Sheet

CAMP DRESSER & McKEE

CDM

125 South Wacker Drive, Suite 600
Chicago, Illinois 60606

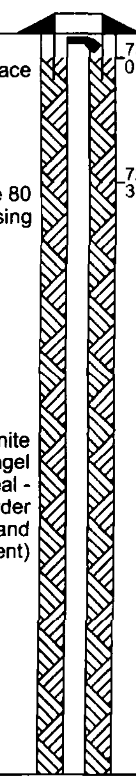
BORING LOG & WELL CONSTRUCTION DETAIL

EW-01

Client: Illinois EPA
Project Name: SE Rockford - Area 4
Project Location: Rockford, IL
Project Number: 1681-44102

Drilling Contractor: Boart Longyear
Surface Elevation (ft.): 730.58
Drilling Method/Rig: RotoSonic/Sonic Rig
Total Depth (ft.): 65
Drillers: Roy Buckenburger
Depth to Initial Water Level (ft. BGS): 31.5
Drilling Date: Start: 7/17/06 **End:** 7/18/06
Development Method: Surge and Pump
Borehole Coordinates:
Field Screening Instrument: PID
N 2,030,769.21 E 2,594,722.99
Logged By: Daniel Cooper
Development Date: Start 7/20/06 **End** 7/24/06
Top of Riser Elevation (ft.): 730.34

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
									Protective Casing
								Top	of Riser @ 730.34 ft.
								730.6	Ground Surface
						Asphalt and gravel		0	Concrete to surface (730.1 / 0.5)
		0.7			SP	Fine SAND, brown to dark brown, little medium sand and silt, loose, moist, no odor			
SN	1			60/60					6-inch, Schedule 80 PVC casing (727.6 / 3.0)
		1.6			SM	Sandy SILT, dark brown to very dark brown, trace gravel, loose, slightly moist, no odor		725.6 / 5	
					SP	Fine SAND, dark orangish brown, some medium sand, no fines, loose, slightly moist, no odor			
		2.1			SP	Fine to medium SAND, light yellowish brown, well sorted, loose, slightly moist, no odor			Cement - Bentonite Grout (Aquagel Gold Seal - Bentonite powder and Portland cement)
SN	2			120/120				720.6 / 10	
		1.9							
								715.6	



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

CAMP DRESSER & McKEE
CDM
125 South Wacker Drive, Suite 600
Chicago, Illinois 60606

BORING LOG & WELL CONSTRUCTION DETAIL

EW-01

Client: Illinois EPA
Project Name: SE Rockford - Area 4
Project Location: Rockford, IL
Project Number: 1681-44102

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Elev. Depth (ft.)	Well Construction Detail
					SP	Same as above	715.6 15	
		2.2				Fine to medium SAND, light yellowish brown, trace gavel, loose, slightly moist, no odor		
								Bentonite Seal - medium chips
SN	3			120/120			710.6 20	
		0.8						
								707.6 23.0
							705.6 25	#90 Red Flint Filter Pack Sand; 705.6 25.0
		2.3				Same as above		
								#30 slot V-wire PVC screen
		3.2						
SN	4			120/120			700.6 30	
		4.1						
		4.4						
						Wet at 33 feet bgs		
		2.5			SP	Coarse SAND, light yellowish brown, moderatley sorted, subangular grains, loose, wet, no odor	695.6 35	
		0.8						
SN	5	0.9		120/120			690.6 40	
		1.1					685.6	

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BORING LOG & WELL CONSTRUCTION DETAIL

EW-01

Client: Illinois EPA

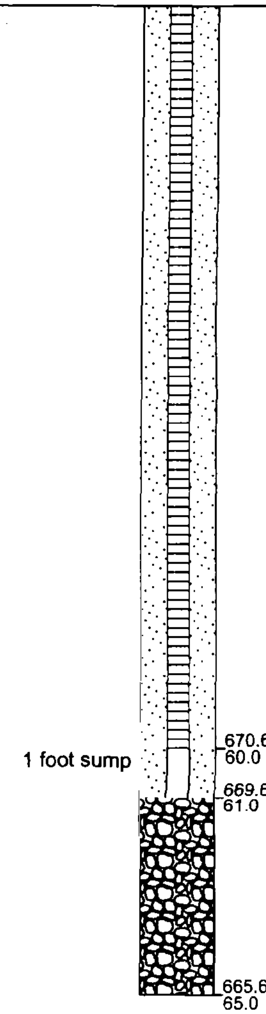
Project Location: Rockford, IL

Project Name: SE Rockford - Area 4

Project Number: 1681-44102

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Elev. Depth (ft.)
							685.6 / 45
SN	6	0.3, 0.2		120/120	SP		680.6 / 50
					SP	Coarse SAND, light yellowish brown, with fine gravel, subangular grains, loose, wet, no odor	675.6 / 55
SN	7	0.4, 0.6		120/120	GP	GRAVEL, with coarse sand, loose, wet, no odor	
					SP	Medium to coarse SAND, light yellowish brown, trace gravel, loose, wet, no odor	670.6 / 60
					ML	Very fine Sand, light yellowish brown, well sorted, loose, wet, no odor	
					CL	CLAY, dark gray, clay with some silt, very stiff, moderately plastic, no odor	665.6 / 65
							660.6 / 70
							655.6

Well Construction Detail



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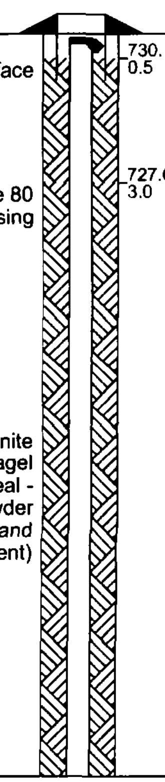
BORING LOG & WELL CONSTRUCTION DETAIL

EW-02

Client: Illinois EPA	**Project Name:** SE Rockford - Area 4
Project Location: Rockford, IL	**Project Number:** 1681-44102

Drilling Contractor: Boart Longyear	**Surface Elevation (ft.):** 730.56
Drilling Method/Rig: RotoSonic/Sonic Rig	**Total Depth (ft.):** 65
Drillers: Roy Buckenburger	**Depth to Initial Water Level (ft. BGS):** 31.5
Drilling Date: Start: 7/18/06 **End:** 7/19/06	**Development Method:** Surge and Pump
Borehole Coordinates:	**Field Screening Instrument:** PID
N 2,030,740.85 E 2,594,724.99	**Logged By:** Daniel Cooper
Development Date: Start 7/24/06 **End** 7/26/06	**Top of Riser Elevation (ft.):** 730.15

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. / Depth (ft.)	Well Construction Detail
								Top	Protective Casing of Riser @ 730.15 ft.
								730.6	*Ground Surface*
						Asphalt and gravel		0	730.1 / 0.5 Concrete to surface
SN	1	0.9		60/60	SM	Sandy SILT, dark brown to very dark brown, some medium to coarse sand and trace gravel, loose, slightly moist, no odor			727.6 / 3.0 6-inch, Schedule 80 PVC casing
					SP	Fine to medium SAND, brownish yellow to light yellowish brown, well sorted, loose, slightly moist, no odor		725.6 / 5	
		1.3							
SN	2	1.6		120/120				720.6 / 10	Cement - Bentonite Grout (Aquagel Gold Seal - Bentonite powder and Portland cement)
		0.8						715.6	



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
- HSA - Hollow Stem Auger
- SSA - Solid Stem Auger
- HA - Hand Auger
- AR - Air Rotary
- DTR - Dual Tube Rotary
- FR - Foam Rotary
- MR - Mud Rotary
- RC - Reverse Circulation
- CT - Cable Tool
- JET - Jetting
- D - Driving
- DTC - Drill Through Casing

SAMPLING TYPES:
- AS - Auger/Grab Sample
- CS - California Sampler
- BX - 1.5" Rock Core
- NX - 2.1" Rock Core
- GP - Geoprobe
- HP - Hydro Punch
- SS - Split Spoon
- ST - Shelby Tube
- WS - Wash Sample

OTHER:
- AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

CAMP DRESSER & McKEE

CDM

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Chicago, Illinois 60606

BORING LOG & WELL CONSTRUCTION DETAIL

EW-02

Client: Illinois EPA

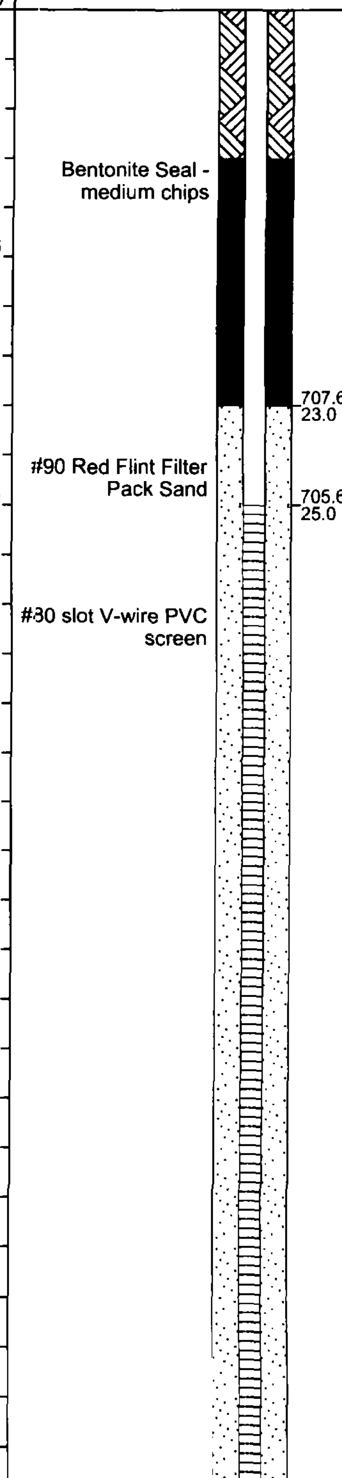
Project Name: SE Rockford - Area 4

Project Location: Rockford, IL

Project Number: 1681-44102

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Elev. / Depth (ft.)
					SP	Same as above Fine to medium SAND, light yellowish brown, trace gavel, loose, slightly moist, no odor	715.6 / 15
		1.9					
SN	3			120/120			710.6 / 20
		2.5					
						Same as above	705.6 / 25
		1.4					
		3.6					
SN	4			120/120			700.6 / 30
		3.9			SP	Medium SAND, light yellowish brown to brownish yellow, moderatley sorted with fine and coarse sand, loose, wet, no odor	
		4.1					
							695.6 / 35
		3.4					
SN	5	1.8		120/120			690.6 / 40
		0.9					685.6

Well Construction Detail



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Chicago, Illinois 60606

BORING LOG & WELL CONSTRUCTION DETAIL
EW-02

Client: Illinois EPA
Project Name: SE Rockford - Area 4
Project Location: Rockford, IL
Project Number: 1681-44102

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Elev. / Depth (ft.)	Well Construction Detail
							685.6 / 45	
		0.2			SP	Same as above		
SN	6			20/120	SP	Coarse SAND, light yellowish brown, with medium sand and trace gravel, no fines, loose, wet, no odor	680.6 / 50	
		0.3			GP	GRAVEL, with coarse sand and trace medium sand, loose, wet, no odor	675.6 / 55	
		0.4			SP	Medium to coarse SAND, light yellowish brown, trace gravel, loose, wet, no odor		671.1 / 59.5
SN	7			20/120	ML	Very fine silty Sand, light yellowish brown, well sorted, loose, wet, no odor	670.6 / 60	1 foot sump; 670.1 / 60.5
		0.2			ML	Very fine silty Sand, gray, well sorted, loose, wet, no odor	665.6 / 65	665.6 / 65.0
							660.6 / 70	
							655.6	

CAMP DRESSER & McKEE
CDM
125 South Wacker Drive, Suite 600
Chicago, Illinois 60606

BORING LOG & WELL CONSTRUCTION DETAIL

EW-03

Client: Illinois EPA
Project Location: Rockford, IL
Project Name: SE Rockford - Area 4
Project Number: 1681-44102

Drilling Contractor: Boart Longyear
Drilling Method/Rig: RotoSonic/Sonic Rig
Drillers: Roy Buckenburger
Drilling Date: Start: 7/20/06 **End:** 7/24/06
Borehole Coordinates:
N 2,030,712.81 E 2,594,726.13
Development Date: Start 7/27/06 **End** 8/8/06
Surface Elevation (ft.): 730.42
Total Depth (ft.): 65
Depth to Initial Water Level (ft. BGS): 31.5
Development Method: Surge and Pump
Field Screening Instrument: PID
Logged By: Daniel Cooper
Top of Riser Elevation (ft.): 730.15

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
								Top	Protective Casing of Riser @ 730.15 ft.
								730.4	*Ground Surface*
						Asphalt and gravel		0	Concrete to surface (729.9 / 0.5)
SN	1			60/60	SM	Sandy SILT, dark brown to very dark brown, trace gravel, loose, slightly moist, no odor			
		0.0			SP	Fine to medium SAND, brownish yellow to light yellowish brown, no gravel, well sorted, loose, slightly moist, no odor			6-inch, Schedule 80 PVC casing (727.4 / 3.0)
								725.4 / 5	
		0.3							Cement - Bentonite Grout (Aquagel Gold Seal - Bentonite powder and Portland cement)
SN	2			120/120				720.4 / 10	
		0.6							
								715.4	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.5" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
AGS - Above Ground Surface

REMARKS

Reviewed by: **Date:**

CAMP DRESSER & McKEE

CDM

125 South Wacker Drive, Suite 600
Chicago, Illinois 60606

BORING LOG & WELL CONSTRUCTION DETAIL

EW-03

Client: Illinois EPA

Project Name: SE Rockford - Area 4

Project Location: Rockford, IL

Project Number: 1681-44102

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Elev. / Depth (ft.)	Well Construction Detail
					SP		715.4 / 15	
					SP	Same as above		
		0.2				*Fine to medium SAND, light yellowish brown, loose, slightly moist, no odor*		
SN	3			120/120			710.4 / 20	Bentonite Seal - medium chips (710.4 / 20.0)
		0.4						
							705.4 / 25	705.4 / 25.0
					SP	Same as above		
		0.7						#90 Red Flint Filter Pack Sand (703.4 / 27.0)
SN	4	2.6		120/120			700.4 / 30	#80 slot V-wire PVC screen
		4.1						
		4.5			SP	Medium SAND, light yellowish brown to brownish yellow, moderatley sorted with fine and coarse sand, loose, wet, no odor		
							695.4 / 35	
		1.2						
SN	5			120/120	SP	Medium to coarse SAND, light yellowish brown, trace gravel, no fines, loose, wet, no odor	690.4 / 40	
		1.0					685.4	

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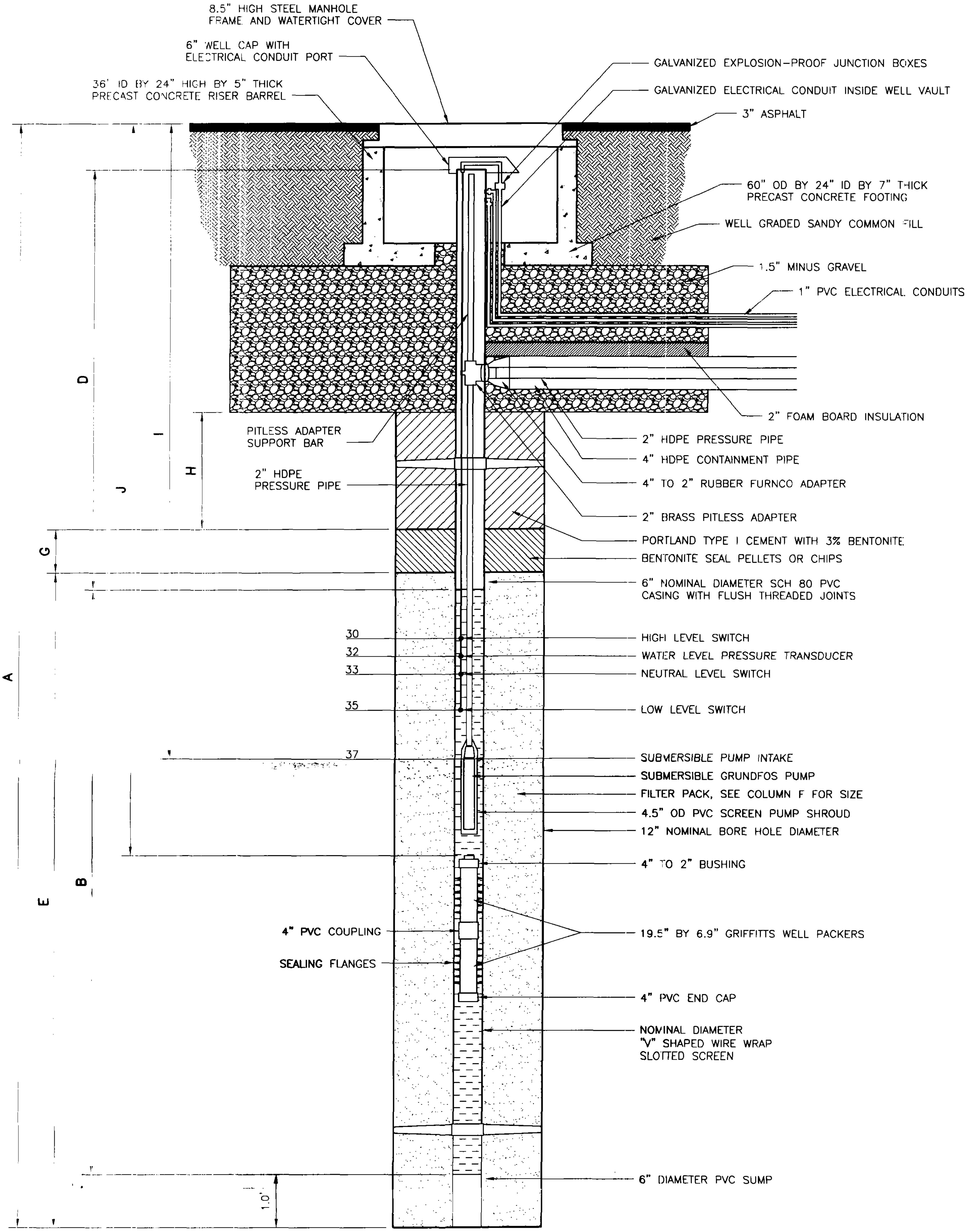
Chicago, Illinois 60606

BORING LOG & WELL CONSTRUCTION DETAIL

EW-03

Client: Illinois EPA
Project Location: Rockford, IL
Project Name: SE Rockford - Area 4
Project Number: 1681-44102

Sample Type	Sample Number	Field Instrument Reading (ppm)	Blows per 6 Inches	Sample Recovery (in.)	Stratum Designation	Material Description	Elev. / Depth (ft.)	Well Construction Detail
					SP		685.4 / 45	
					SP	Medium SAND, light yellowish brown to brownish yellow, moderatley sorted with fine and coarse sand, loose, wet, no odor		
SN	6	0.6 / 0.1		120/120	SP	Medium to coarse SAND, light yellowish brown, with gravel, no fines, loose, wet, no odor	680.4 / 50; 675.4 / 55	
SN	7	0.4 / 0.3		120/120			670.4 / 60	
					GP	GRAVEL, with coarse sand and trace medium sand, loose, wet, no odor		1 foot sump; 668.4 / 62.0; 667.4 / 63.0
					CL	Silty CLAY, gray, very stiff, no odor	665.4 / 65	665.4 / 65.0
							660.4 / 70	
							655.4	



NOT TO SCALE

TABLE 1
EXTRACTION WELL DIMENSIONS

WELL	A TOTAL DEPTH (feet)	B SCREEN LENGTH (feet)	C SCREEN SLOT SIZE (inches)	D CASING LENGTH (feet)	E FILTER PACK HEIGHT (feet)	F FILTER PACK TYPE	G BENTONITE SEAL HEIGHT (feet)	H CEMENT-BENTONITE GROUT SEAL HEIGHT (feet)	I DEPTH TO PUMP INTAKE (feet)	J TOP OF PACKER (feet)	K TRANSDUCER (feet)	L LOW LEVEL SWITCH (feet)	M NEUTRAL LEVEL SWITCH (feet)	N HIGH LEVEL SWITCH (feet)
EW1	61	35	0.008	24.5	38	#90 RED FLINT FILTER PACK SAND	5	15	37	42	32	35	33	30
EW2	60.5	35	0.008	24	38	#90 RED FLINT FILTER PACK SAND	5	14.5	37	43	32	35	33	30
EW3	63	35	0.008	26.5	38	#90 RED FLINT FILTER PACK SAND	5	17	37	42	32	35	33	30

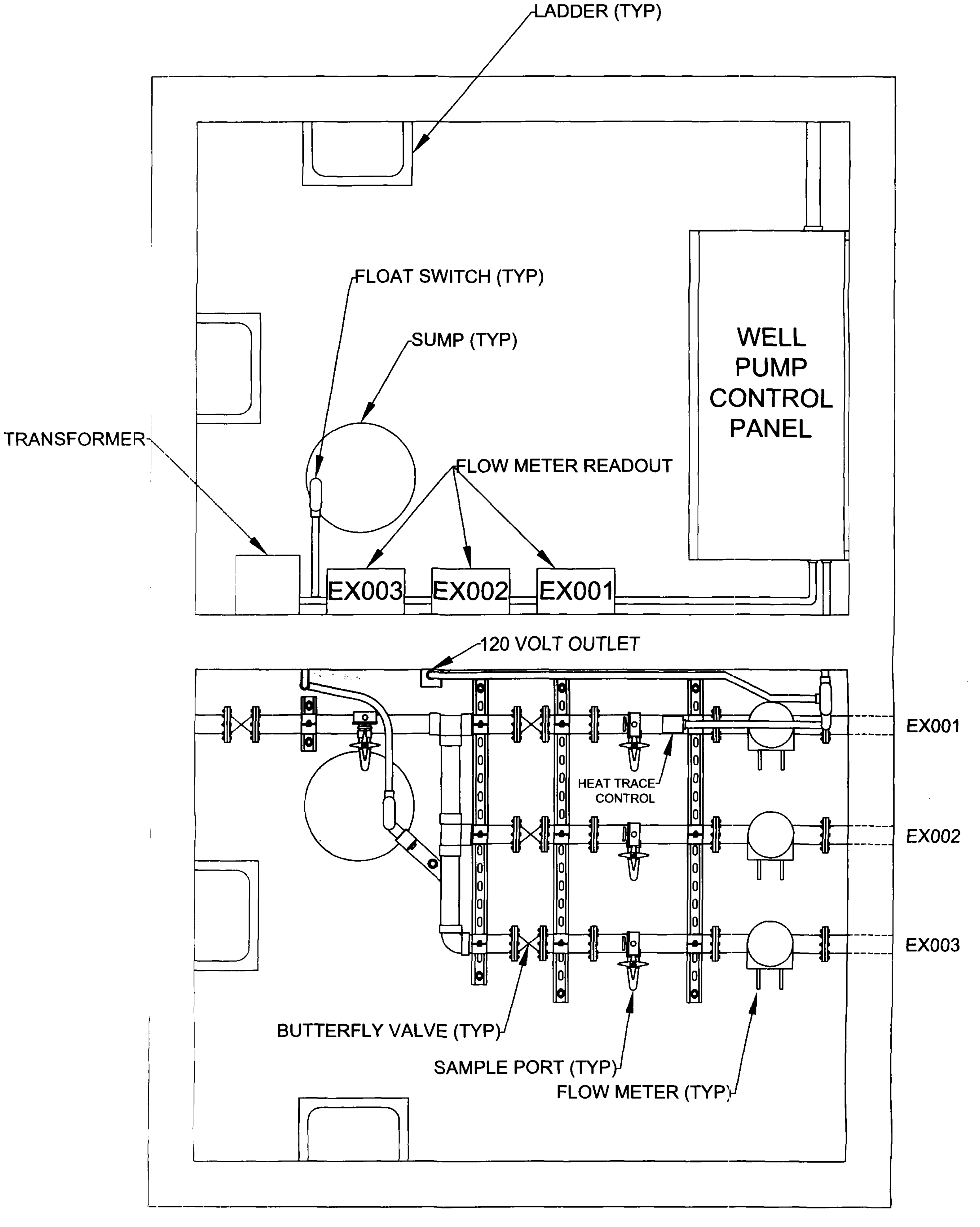
P:\SE Rockford\Area 4\RA Report\Well As-built\ Figure 01/26/11 ... KozmickM

EXTRACTION WELL CONNECTION DETAIL

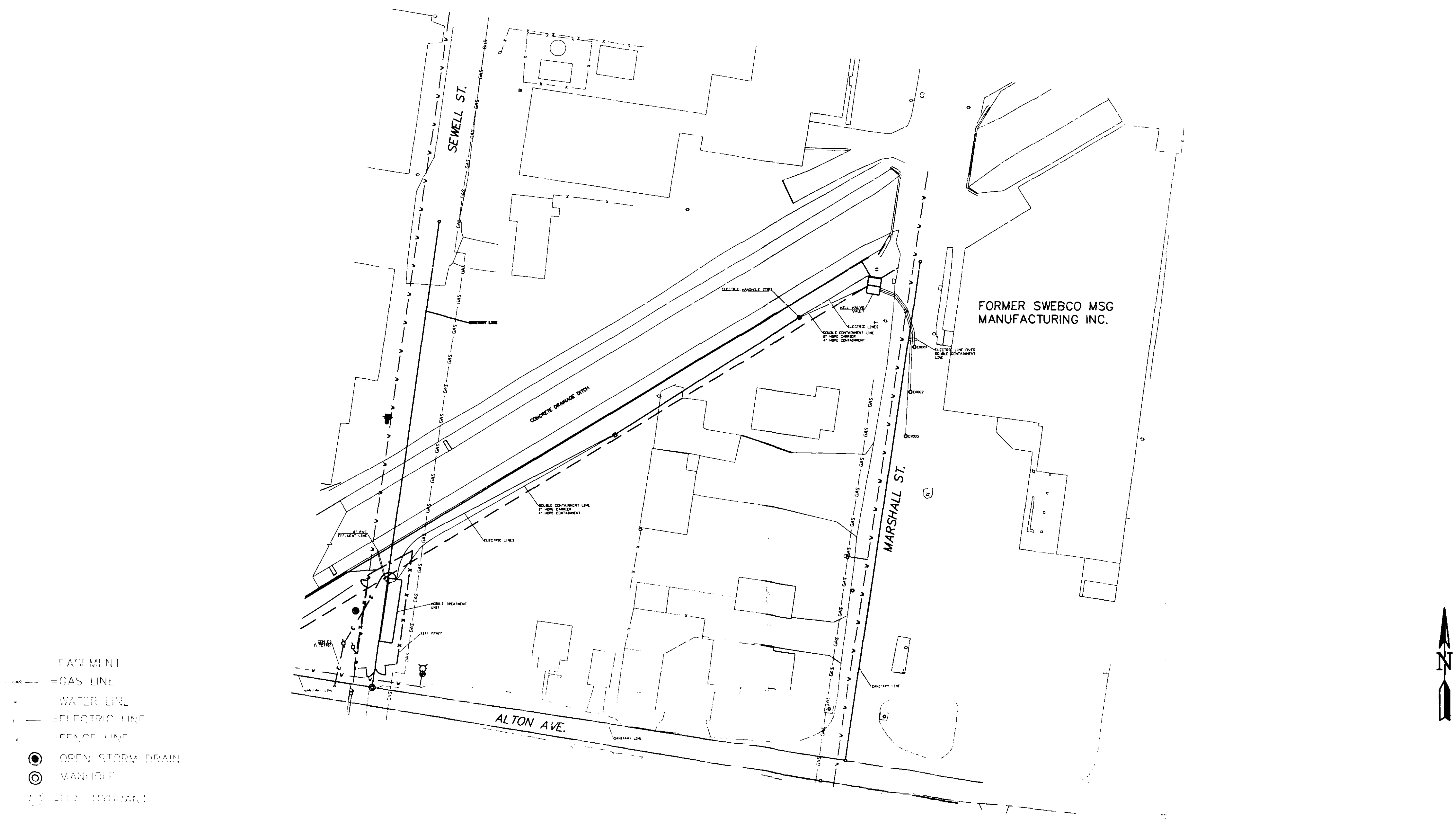
CDM Camp Dresser & McKee

C:\Documents and Settings\CADD\Desktop\Jamie's Cad\

LAST REVISION	DATE	BY



BODINE ENVIRONMENTAL SERVICES, INC	.5' 0 1'	SCALE: 1" = 1'	WELL VALVE VAULT	BODINE PROJECT #120322-11
		DRAWING #: SER-2	IEPA - SE ROCKFORD AREA #4 2630 MARSHALL STREET ROCKFORD, ILLINOIS 61104	
	1-12-11	DRAWN BY: J. MARTIN / CK BY:		



BODINE ENVIRONMENTAL SERVICES, INC.

Bodine Environmental Services, Inc.
5350 East Firehouse Road
Decatur, Illinois 62521-9601
(800) 637-2379

30 0 30 60 SCALE: 1" = 60' 0"

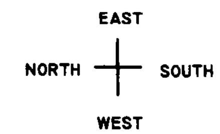
DRAWN BY: J. MARTIN | DATE: 01-14-11 | CK. BY:

SE ROCKFORD AREA #4

IEPA - SE ROCKFORD AREA #4
2630 MARSHALL STREET
ROCKFORD, ILLINOIS 61104

DRAWING NO:

SCALE BAR, EACH BLOCK IS 12" LONG



** CIVIL CONSTRUCTION NOTES **

- THERMAL INSULATION ON WALLS AND CEILING
- THERMAL INSULATION ON FLOOR
- STEEL SIDING
- OVERHEAD LIGHT IN CONTROL PANELS
- SUNSHIELDS ON PANELS
- PANEL HEATER KITS
- DOCUMENT HOLDER IN PANELS

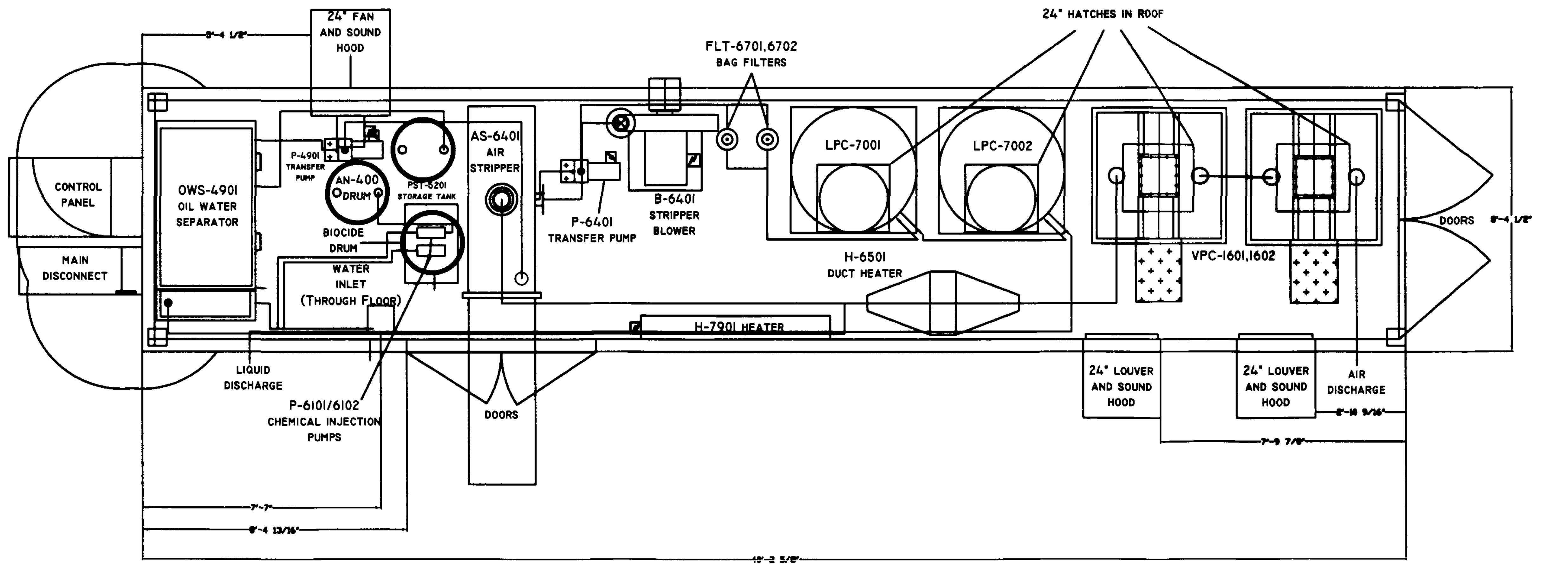
**MECH./ELECT. ASS'Y NOTES **

- LOCATE COOLING THERMOSTAT IN THE WARMEST LOCATION AT CEILING LEVEL.
- LOCATE HEATING THERMOSTAT AT FLOOR LEVEL.
- VIBRATION ISOLATORS UNDER EQUIPMENT.
- MAXIMUM WIDTH FOR SHIPPING IS 102". THIS INCLUDES ALL CONNECTIONS THAT PROTRUDE THROUGH THE SIDES OF THE ENCLOSURE.

*** COMMISSIONING NOTES ***

- BUILDINGS NEED TO BE SHIMMED ON SITE TO ALLOW DOORS TO OPEN FREELY. PLEASE HAVE SHIMMING MATERIAL READY DURING BUILDING INSTALLATION.
- FAN AND LOUVER HOODS NEED TO BE INSTALLED ON SITE. CANNOT SHIP WITH HOODS ATTACHED.
- FOR BUILDINGS IN COLD WEATHER CLIMATES, WHERE THE BUILDING IS ELEVATED, A SKIRT MUST BE BUILT AROUND THE BASE TO PREVENT THE FLOOR FROM FREEZING.

NOTE: LOCATE LOUVERS AND FANS AS CLOSE TO CEILING AS POSSIBLE.



*** PACKING LIST ***

DESCRIPTION	DIM (L X W X H)	WEIGHT
REMEDIATION SYSTEM	40'x8'x10'	28000 LBS

FLOW DIRECTION
ELECTRICAL CONNECTION
FLOW INTO THE PAGE
FLOW OUT OF THE PAGE
THIS AREA REPRESENTS SERVICE SPACE REQUIRED

LEVEL	DATE	BY	REVISION
E	NOV 08, 10	MH	FIELD MODIFICATIONS
C	OCT 02, 09	JH	AS BUILT
B	JUN 15, 09	JH	FOR PRODUCTION
A	MAR 17, 09	JH	FOR APPROVAL

DWG. NO: 50570- 02
TITLE: SYSTEM LAYOUT
CUSTOMER: SE ROCKFORD
BODINE ENVIRONMENTAL SERVICES
MLE EQUIPMENT INC.

Se Rockford Area #4 Preventative Operation and Maintenance

Equipment	Operation & Maintenance Item	Frequency
Chemical Injection Pumps	Pump Clean Water Through Pumps	Quarterly
Oil Water Separator (OWS)	Clean and Remove Solids	Quarterly
Oil Water Separator (OWS)	Remove Media and Pressure Wash	Quarterly
Oil Water Separator (OWS) Level Switches	Test Operation & Clean	Quarterly
Air Stripper	Remove Trays and Pressure Wash	Quarterly
Air Stripper	Remove Soilds and Clean Inside of Air Stripper	Quarterly
Air Stripper	Check Integrity of Door and Tray Gaskets	Quarterly
Air Stripper	Check Demister Pad and Clean if Necessary	Annually
Air Stripper Level Switches	Test Operation & Clean	Quarterly
Air Stripper Blower	Check Fan Wheel Wear or Corrosion	Annually
Air Stripper Blower	Check V-Belt Drive for Proper Alignment and Tension	Annually
Bag Filter Units	Check/Change Filter Bags	Weekly
Bag Filter Units	Check "O" Ring Seal	Weekly
OWS, Air Stripper & Bag Filters	Circulate AN-974 Biodisperant Through Equipment for Additional Cleaning	Quarterly
Liquid Carbon Tanks	Backwash Carbon	Quarterly
Liquid Carbon Tanks	Remove Spent Carbon & Install Reactivated Carbon (If Necessary)	Annually
Vapor Carbon Tanks	Remove Spent Carbon & Install Reactivated Carbon (When in Operation)	Quarterly
Vapor Carbon Tanks	Check for Excessive Water in Bottom of the Vessel (When in Operation)	Quarterly
Well Valve Vault Valves	Open & Close Valves to Improve System Flow Rates	Bi-Weekly
Well Valve Vault Level Switches	Test Operation & Clean	Quarterly
Extraction Well #3	Remove/Clean Pump and Clean Well Screen with Citric Acid Chemical	Bi-Annually
Extraction Well #1 & #2	Remove and Clean Pump (If Necessary)	Annually
Extraction Well Transucers and Level Switches	Remove and Clean	Annually
Programming Logic Control (PLC)	Test Alarms, Critical Inputs & Outputs	Annually

OPERATIONS LOG

Site Name:	IEPA SE Rockford Source Area 4	Route originals to:	T. McFate (BESI)
Job Number:	Bodine 120322-11	CC:	J. Grabs (CDM)
Site Location:	Sewell St. Rockford, Illinois		Treatment Files

A. Leachate Treatment System Flow

Date: ____________________

A1. Combined Extraction Flowrate ______________ gpm

A2. Totalizer Reading ______________ gallons

On arrival was LTS Operating? Yes / No

A3. Totalizer Reading (Previous Visit) ______________ gallons

B. GROUNDWATER EXTRACTION/DISCHARGE SYSTEM

B1) EW-001
Normal Flow
18-22 gpm

Operating Status hand / off / auto
Operating Pressure ______________ psi
Flow ______________ gpm
Total Gallons ______________ gallons

B2) EW-002
Normal Flow
18-22 gpm

Operating Status hand / off / auto
Operating Pressure ______________ psi
Flow ______________ gpm
Total Gallons ______________ gallons

B3) EW-003
Normal Flow
18-22 gpm

Operating Status hand / off / auto
Operating Pressure ______________ psi
Flow ______________ gpm
Total Gallons ______________ gallons

General Comments ____________________

C. SAMPLE COLLECTION DATA

Location	Analyte	Identification	pH	Sample Collected
Influent	VOCs	A4-S1I		Yes / No
Effluent	VOCs	A4-S1E		Yes / No
Lead Carbon Effluent	VOCs	A4-L1E		Yes / No
OWS Effluent	VOCs	A4-O1E		Yes / No
Air Stripper Effluent	VOCs	A4-A1E		Yes / No
Lead Vapor Carbon Influent	VOCs	A4-V1I		Yes / No
Lead Vapor Carbon Effluent	VOCs	A4-V1E		Yes / No
Lag Vapor Carbon Effluent	VOCs	A4-V2E		Yes / No
Field Duplicate Sample	VOCs	A4-S1I-D		Yes / No
Field Blank Sample	VOCs	A4-FB01		Yes / No
Matrix Spike/Matrix Spike Dup.	VOCs	A4-S1E-MSD		Yes / No

[redacted]

D. LEACHATE TREATMENT SYSTEM

1) Oil Water Separator	Transfer Pump	Operating Status		hand / off / auto
		Operating Pressure	(Normal 20)	________PSI
	Level Switch	Operating Correctly?		Yes / No
		Clean floats		Yes / No
	Components	Influent Pressure	(Normal 10)	________PSI
		OWS Vent	(Cracked Open)	Yes / No
2) Air Stripper	Blower	Operating Status		hand / off / auto
		Differential Pressure Gauge (PDI-6401)	(Normal 30-40)	________Inches of Water
		Pilot Tube Meter/Gauge (PDI-6402)	(Normal .6)	________Inches of Water
		Blower Discharge (PI-6401)	(Normal 20-25)	________Inches of Water
		Damper/Valve Position	(Normal Position 5)	________Position
	Transfer Pump	Operating Status		hand / off / auto
		Operating Pressure	(Normal 20-35)	________PSI
	Level Switch	Operating Correctly?		Yes / No
		Clean floats and sight glass	When Necessary	Yes / No
	Pressure Switch	Operating Correctly?		Yes / No
		Check relay operation		Yes / No

3) Additional Readings	Bag Filter 1 Upper Pressure	(Normal 10-20)	________PSI
	Bag Filter 1 Lower Pressure	(Normal 10-20)	________PSI
	Bag Filter 2 Upper Pressure	(Normal 10-20)	________PSI
	Bag Filter 2 Lower Pressure	(Normal 10-20)	________PSI
	Lead Carbon Vessel Inlet Pressure	(Normal 5-15)	________PSI
	Lag Carbon Vessel Inlet Pressure	(Normal 5-10)	________PSI
	Lead Carbon Vapor Vessel Pressure	(Normal 5-10)	________PSI

E. BUILDING CONDITIONS AND MISC.

1) Building Exhaust Fan	Operating Correctly?	Yes / No
2) Building Louver 1 (Blower Inlet)	Clear of debris	Yes / No
3) Building Louver 2 (North)	Clear of debris	Yes / No
4) Building Louver 3 (South)	Clear of debris	Yes / No
5) Duct Heater	Operating Correctly?	Yes / No
6) AN-400 Anti-Scalent Pump	Operating Correctly?	Yes / No
6a) AN-400 Drum Level		_____ Gallons
7) Biocide Pump	Operating Correctly?	Yes / No
7a) Biocide Drum Level		_____ Gallons
8) Piping and valves	Inspect	Yes / No
9) Building Lights	Operational?	Yes / No
10) Water In Piping Side Vault Sump		Yes / No
11) Water In Electrical Vault Sump		Yes / No
12) Pump Out All Sumps As Needed		Yes / No
13) Empty Dehumidifiers As Needed		Yes / No
14) Check Airstripper Intake For Debris		Yes / No
15) Check Airstripper Exhaust For Debris		Yes / No

Date:

Operator:

Signature:

Comments/Notes

Appendix D
Pre-Final Inspection Checklist

Pre-Final Inspection Checklist
Source Area 4 Remedial Action, Leachate Control Component
Southeast Rockford Groundwater Contamination Superfund Site

Date: October 6, 2010

Present: Doyle Wilson, Illinois EPA
Tim Drexler, USEPA
Troy McFate, Bodine
John Grabs, CDM

Conditions: Sunny, 70° F

Item	Complete?	Comments
Site Work		
Pavement/asphalt condition; settling	Yes	Ok for now; poor asphalt condition adjacent to new asphalt and snow plowing will likely cause damage in the near future requiring repairs
Silt fencing/sediment baskets removed	Yes	None
Vegetation established	Partial	Small bare spots around valve vault that Bodine will reseed; good condition along drainage ditch; see Action Items
Construction debris removed	Partial	HDPE piping and a few other items near construction trailer that Bodine will remove; see Action Items
Gravel pad condition	Partial	Some minor erosion on west side near storm drain; further discussions required to determine how/if it needs to be fixed; see Action Items
Fence and gates	Yes	None
Notification sign	No	Agreed that sign is needed; CDM to follow up on content; see Action Items
Construction trailer removed and area restored	No	Agreed that trailer and utilities will remain based on continuing need related to Area 4 and other work at SERGC; no further action required
Well Valve Vault		
Replace stair ladder	Partial	Additional stair ladder installed; agreed that existing stair ladder will remain. No further action required.
Leak fixed	Yes	Joints around concrete cover sealed; however, extremely heavy rain will still overwhelm drain system around metal doors
Piping leaks	Partial	Minor leaks around flanges when system has been turned off for several days (seals may dry out?); minor issue that doesn't need to be addressed for now; no

Pre-Final Inspection Checklist
Source Area 4 Remedial Action, Leachate Control Component
Southeast Rockford Groundwater Contamination Superfund Site

Item	**Complete?**	**Comments**
		further action required
Heat trace functioning	Yes	Based on operation during the past winter
Sumps covered	Yes	None
Treatment Unit		
Equipment functioning	Yes	None
Discharge pipe and valve	No	Flapper valve recently stolen but grate installed to prevent critter incursion; if valve is replaced will possibly be stolen again so will not replace for now; no further action required
Condition of insulation	Yes	None
Iron treatment system	Yes	None
Test remote operation	Partial	Only tested shut-off; agreed that under no circumstance would system be started remotely; no further action required
Alarms and notification system	Yes	None
Noise level	Yes	Based on previous noise readings taken during system start up; Bodine to confirm readings and CDM to confirm noise ordinance
Heat trace functioning	Yes	Based on operation during the past winter
Treatment unit bolted down	No	Bodine to install bolts; see Action Items
External conditions: doors, vent covers, etc.	Yes	None
Internal conditions: temperature, piping, floor, etc.	Yes	Will continue to monitor condition of floor and epoxy coating that was applied by Bodine
Spare Parts (see attached list) Bulk carbon and extra carbon vessels returned for credit		
Other Observations Remove drums from outside of treatment unit; see Action Items Set of keys to Illinois EPA; see Action Items		

Pre-Final Inspection Checklist
Source Area 4 Remedial Action, Leachate Control Component
Southeast Rockford Groundwater Contamination Superfund Site

Action Items:

Item	Status	Comment
Bodine to reseed small areas of poor vegetation around well valve vault	Complete	None
Bodine to remove left over HDPE piping and few other items from around construction trailer, remove drums from near treatment unit	Complete	None
IEPA, CDM, and Bodine to discuss need to repair minor erosion on west side of treatment system gravel pad and how to repair if necessary	Complete	Bodine will continue to monitor this area and repair if necessary
CDM to follow up on content for notification sign that will be posted on fence surrounding treatment unit; after content is determined, Bodine to procure sign	Partial	Notification sign is currently in production. Estimated completion date is March 11, 2011. CDM will document completion in letter to Illinois EPA Project Manager
Bodine to confirm noise level reading of treatment system measured to during start up and CDM to confirm exact requirements of City of Rockford noise ordinance	Complete	None
Bodine to install bolts to anchor treatment system to concrete pads	Complete	None
Bodine and CDM to provide Illinois EPA with complete set of keys for the site	Complete	None

Appendix E
Remedial Action Photographs

PHOTOGRAPH LOG

Photograph #1 | Date: August 18, 2009 | Photographed by: Nick Anton

Description: View of the start of asphalt removal on Marshall Street, facing south.

Photograph #2 | Date: August 18, 2009 | Photographed by: Nick Anton

Description: View of the well valve vault and cross-country pipe area prior to excavation work, facing southwest.

Photograph Log

Photograph #3 Date: August 18, 2009 Photographed by: Nick Anton

Description: View of the start of well valve vault excavation, facing northeast.

Photograph #4 Date: August 18, 2009 Photographed by: Nick Anton

Description: View of the completed well valve vault excavation, facing south.

PHOTOGRAPH LOG

Photograph #5 Date: August 19, 2009 Photographed by: Nick Anton

Description: View of the crane hoisting the well valve vault into place, facing north.

Photograph #6 Date: August 19, 2009 Photographed by: Nick Anton

Description: View of the start of the pipe trench excavation, facing south.

Photograph #7 Date: August 19, 2009 Photographed by: Nick Anton

Description: View of the completed trench excavation near the well valve vault, facing west.

Photograph #8 Date: August 19, 2009 Photographed by: Nick Anton

Description: View of the completed pipe trench and existing wells, facing north.

PHOTOGRAPH LOG

Photograph #9 Date: August 24, 2009 Photographed by: Nick Anton

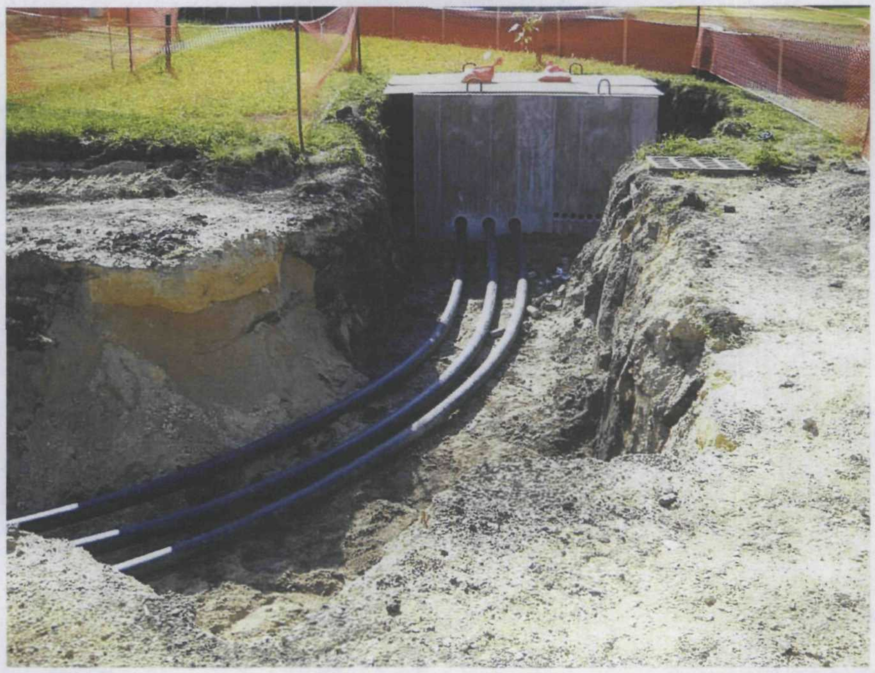
Description: View of pitless adapter connection to existing 6 inch PVC extraction well EW-2, facing southwest.

Photograph #10 Date: August 24, 2009 Photographed by: Nick Anton

Description: View of fusing 4-inch HDPE containment pipe.

Photograph Log

Photograph #11 Date: August 24, 2009 Photographed by: Nick Anton



Description: View of the placement of process pipe from extraction wells to well valve vault, facing west.

Photograph #12 Date: August 25, 2009 Photographed by: Nick Anton

Description: View of installed electrical conduit from extraction wells to well valve vault, facing west.

Photograph Log

Photograph #13 Date: August 25, 2009 Photographed by: Nick Anton

Description: View of the connections for influent 2-inch and 4-inch HDPE pipe inside well valve vault, facing east.

Photograph #14 Date: August 25, 2009 Photographed by: Nick Anton

Description: View of installed electrical conduit from well valve vault to treatment plant, facing west.

PHOTOGRAPH LOG

Photograph #15 Date: August 25, 2009 Photographed by: Nick Anton

Description: View of process pipe and electrical conduit in trench, facing south.

Photograph #16 Date: August 25, 2009 Photographed by: Nick Anton

Description: View 4-inch HDPE connection at extraction well EW-3, facing west.

PHOTOGRAPH LOG

Photograph #17 Date: August 26, 2009 Photographed by: Nick Anton

Description: View of placement of foam board insulation over process pipe, facing south.

Photograph #18 Date: August 26, 2009 Photographed by: Nick Anton

Description: View of backfill of trench with gravel over process pipe, facing south.

PHOTOGRAPH LOG

Photograph #19 Date: August 27, 2009 Photographed by: Nick Anton

Description: View of electrical conduit connections and well cap to extraction well EW-3, facing east.

Photograph #20 Date: August 31, 2009 Photographed by: Nick Anton

Description: View of compaction of backfill around extraction well EW-3 prior to well vault placement, facing southwest.

Photograph #21 Date: August 31, 2009 Photographed by: Nick Anton

Description: View of gravel base and placed concrete footing at extraction well EW-3, facing southwest.

Photograph #22 Date: August 31, 2009 Photographed by: Nick Anton

Description: View of installed concrete footing and riser at extraction well EW-3, facing southwest.

PHOTOGRAPH LOG

Photograph #23 Date: August 31, 2009 Photographed by: Nick Anton

Description: View of compaction of common fill between extraction wells EW-2 and EW-3, facing southwest.

Photograph #24 Date: August 31, 2009 Photographed by: Nick Anton

Description: View of placement of common fill around extraction well EW-1, facing north.

PHOTOGRAPH LOG

Photograph #25 Date: September 1, 2009 Photographed by: Nick Anton

Description: View backfill of common fill around extraction well vaults, facing north.

Photograph #26 Date: September 1, 2009 Photographed by: Nick Anton

Description: View of installed steel manhole frame at extraction well EW-2, facing south.

PHOTOGRAPH LOG

Photograph #27 | Date: September 2, 2009 | Photographed by: Nick Anton

Description: View of placement of road gravel base on Marshall Street and around extraction wells, facing north.

Photograph #28 | Date: September 2, 2009 | Photographed by: Nick Anton

Description: View of placement of road gravel base on Marshall Street and around extraction wells, facing south.

PHOTOGRAPH LOG

Photograph #29 Date: September 3, 2009 Photographed by: Nick Anton

Description: View of final grading and compaction of road gravel base on Marshall Street, facing south.

Photograph #30 Date: September 3, 2009 Photographed by: Nick Anton

Description: View of placement and compaction of binder course asphalt on Marshall Street, facing south.

PHOTOGRAPH LOG

Photograph #31 Date: September 3, 2009 Photographed by: Nick Anton

Description: View of completed asphalt pavement on Marshall Street, facing north.

Photograph #32 Date: September 8, 2009 Photographed by: Nick Anton

Description: View of installed well valve vault cover, facing south.

PHOTOGRAPH LOG

Photograph #33 Date: September 9, 2009 Photographed by: Nick Anton

Description: View of graded road gravel base placed at treatment unit area, facing south.

Photograph #34 Date: September 9, 2009 Photographed by: Nick Anton

Description: View of directional drilling rig stationed near the treatment unit area, drilling hole for cross-country process pipe, facing north.

Photograph Log

Photograph #35 Date: September 10, 2009 Photographed by: Nick Anton

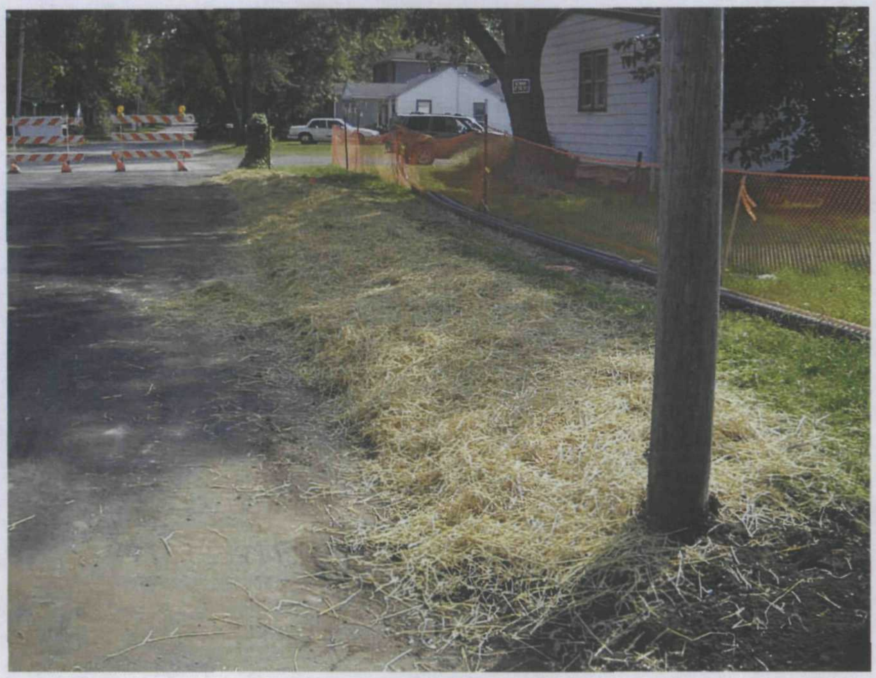
Description: View of pulling 4-inch HDPE pipe back through directional drilling bore hole within trench to the west of the well valve vault, facing west.

Photograph #36 Date: September 10, 2009 Photographed by: Nick Anton

Description: View of compaction of common fill over effluent process pipe from the well valve vault, facing west.

PHOTOGRAPH LOG

Photograph #37 Date: September 10, 2009 Photographed by: Nick Anton



Description: View of regraded, seeded, and mulched right of way along Marshall Street, facing south.

Photograph #38 Date: September 16, 2009 Photographed by: Nick Anton

Description: View of cross-country electrical conduit installation between well valve vault and treatment unit, facing southwest.

PHOTOGRAPH LOG

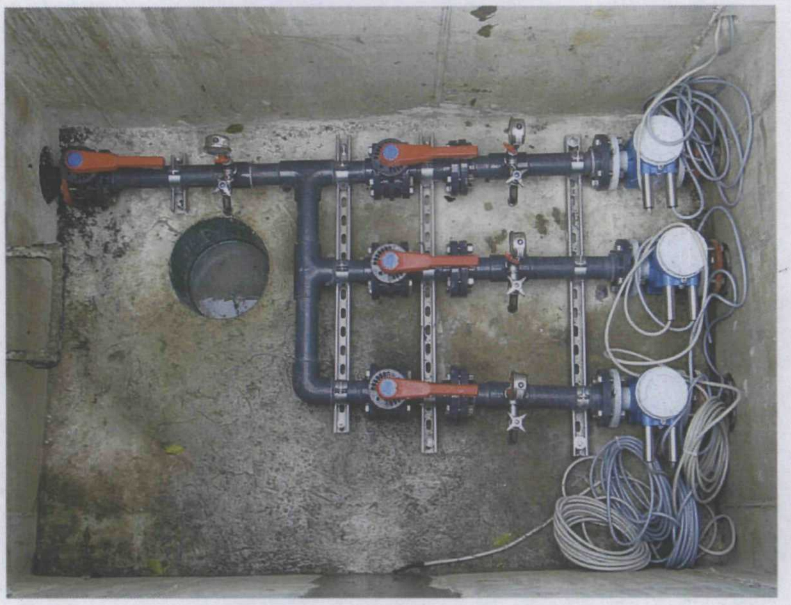
Photograph #39 Date: September 17, 2009 Photographed by: Nick Anton

Description: View of backfill of cross-country electrical conduit trench and placement of magnetic warning tape, facing southwest.

Photograph #40 Date: September 18, 2009 Photographed by: Nick Anton

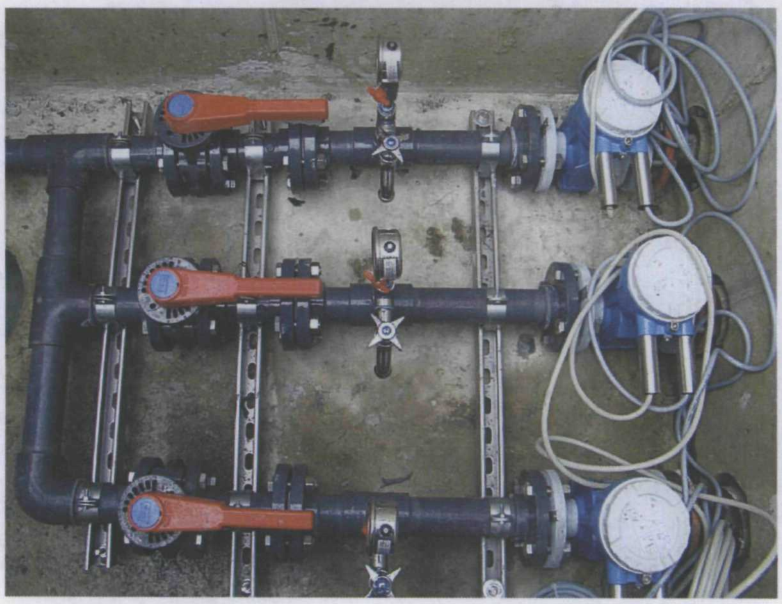
Description: View of graded, seeded, and mulched area around well valve vault, facing west.

Photograph #41 Date: October 6, 2009 Photographed by: Nick Anton



Description: View of installed process pipe, valves, flow meters, pressure gauges, and sample ports inside well valve vault, facing down/north.

Photograph #42 Date: October 6, 2009 Photographed by: Nick Anton



Description: View of influent flow meters, pressure gauges/sample ports, and valves from each extraction well (in order of flow direction), facing down/north.

PHOTOGRAPH LOG

Photograph #43 Date: October 6, 2009 Photographed by: Nick Anton

Description: View of pressure gauge/sample port, and valve for combined flow piping to treatment unit, facing north.

Photograph #44 Date: October 6, 2009 Photographed by: Nick Anton

Description: View of installed electrical hand hole between well valve vault and treatment unit area, facing southwest.

PHOTOGRAPH LOG

Photograph #45 Date: October 19, 2009 Photographed by: Shawn Shiffer

Description: View of gravel treatment unit foundation with effluent process pipe, facing south.

Photograph #46 Date: October 27, 2009 Photographed by: Shawn Shiffer

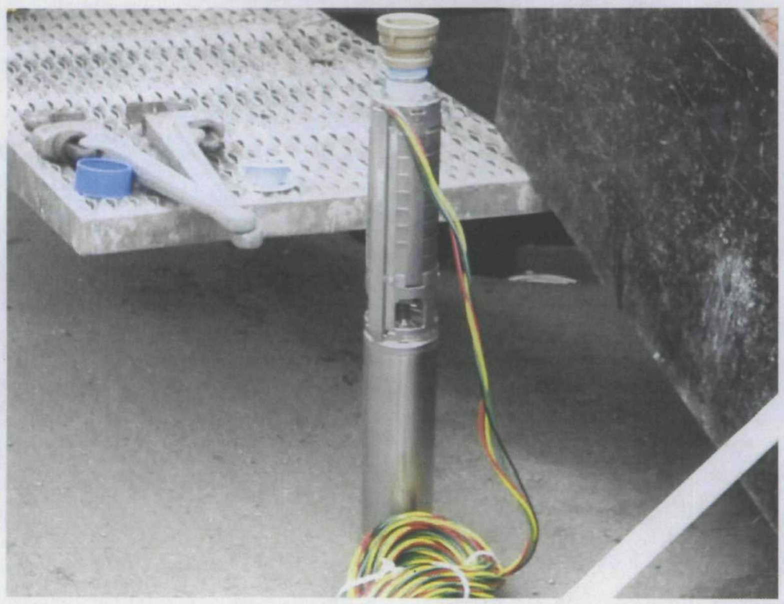
Description: View of well packer being installed in extraction well EW-3, facing west.

PHOTOGRAPH LOG

Photograph #47 Date: October 27, 2009 Photographed by: Shawn Shiffer

Description: View of well packer assembly, facing west.

Photograph #48 Date: October 28, 2009 Photographed by: Shawn Shiffer



Description: View of extraction well pump prior to installation in extraction well EW-1, facing southwest.

PHOTOGRAPH LOG

Photograph #49 | Date: October 28, 2009 | Photographed by: Shawn Shiffer

Description: View of subcontractor connecting discharge pipe to pump that is inside of shroud, facing east.

Photograph #50 | Date: November 2, 2009 | Photographed by: Shawn Shiffer

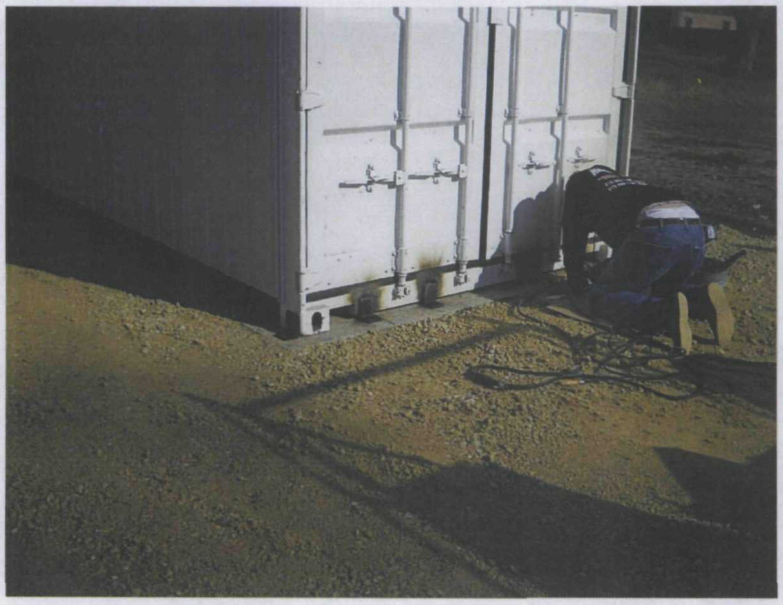
Description: View of treatment unit being lowered into place, facing southwest.

PHOTOGRAPH LOG

Photograph #51 Date: November 2, 2009 Photographed by: Shawn Shiffer

Description: View of treatment unit placement on northern concrete pad, facing east.

Photograph #52 Date: November 2, 2009 Photographed by: Shawn Shiffer



Description: View of treatment unit placement on southern concrete pad with subcontractor attaching angle brackets that will anchor treatment unit to concrete pad, facing northeast.

PHOTOGRAPH LOG

Photograph #53 Date: November, 2009 Photographed by: Shawn Shiffer

Description: View of contractor attaching one of several vent hoods to side of treatment unit, facing north.

Photograph #54 Date: November 9, 2009 Photographed by: Shawn Shiffer

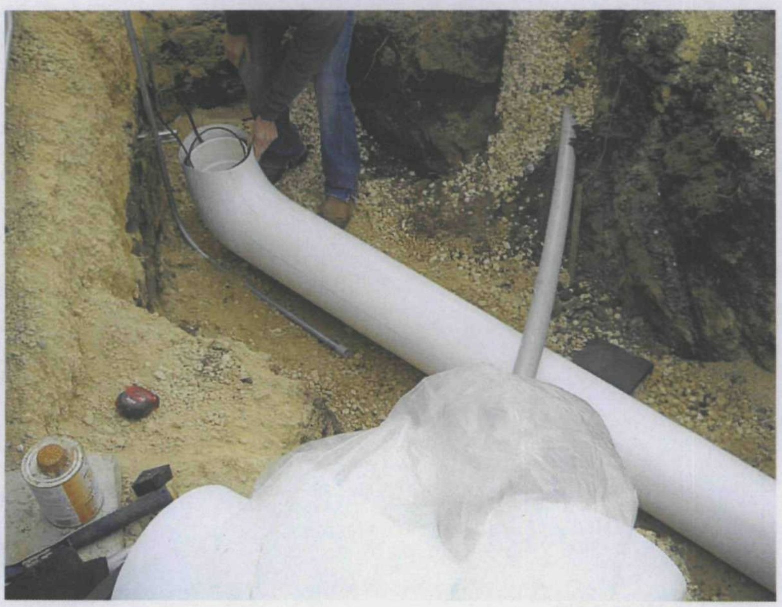
Description: View of effluent discharge pipe being installed, facing northwest.

Photograph Log

Photograph #55 Date: November 10, 2009 Photographed by: Shawn Shiffer

Description: View of subcontractor installing insulation on effluent discharge pipe, facing south.

Photograph #56 Date: November 10, 2009 Photographed by: Shawn Shiffer



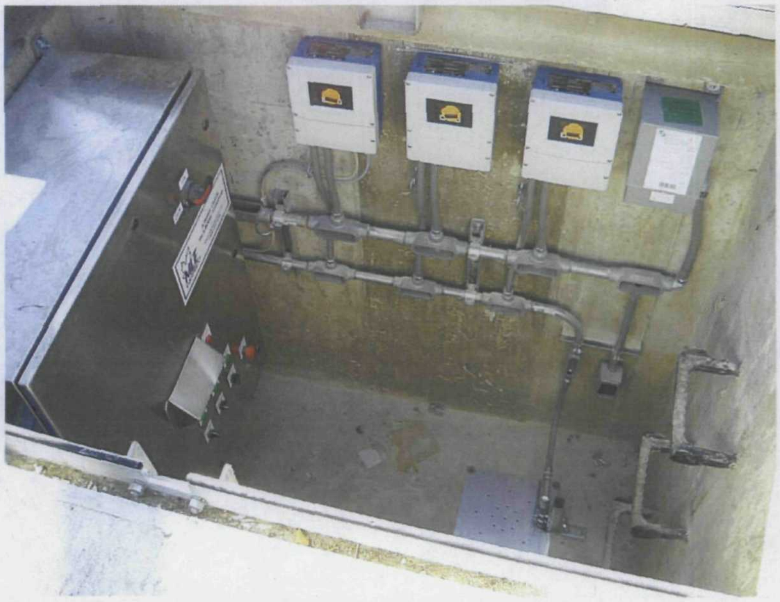
Description: View of effluent discharge pipe after insulation has been completed, facing southwest.

PHOTOGRAPH LOG

Photograph #57 Date: November 9, 2009 Photographed by: x

Description: View of installed effluent discharge pipe prior to attaching flapper valve on the end, facing southwest.

Photograph #58 Date: November 12, 2009 Photographed by: Shawn Shiffer



Description: View of electrical side of well valve vault, facing down.

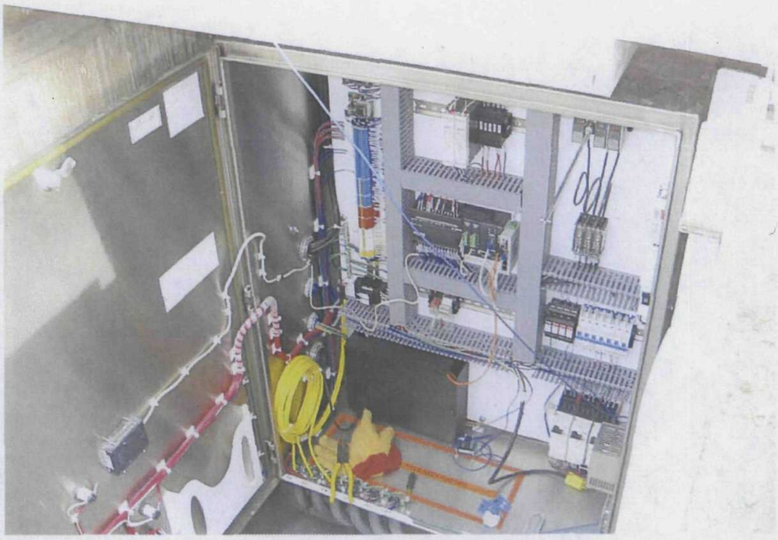
Photograph #59 Date: November 12, 2009 Photographed by: Shawn Shiffer

Description: View of backfilled cross county pipe run trench being graded prior to seeding, facing northeast.

Photograph #60 Date: November 13, 2009 Photographed by: Shawn Shiffer

Description: View of cross country pipe run trench area after seeding and silt fence removal, facing northeast.

Photograph #61 Date: November 13, 2009 Photographed by: Shawn Shiffer



Description: View of electrical control panel inside well valve vault, facing northeast.

Photograph #62 Date: November 13, 2009 Photographed by: Shawn Shiffer

Description: View of grout that was applied to inside joint between well valve vault box and lid, facing northeast.

Photograph #63 Date: December 1, 2009 Photographed by: Shawn Shiffer

Description: View of effluent being discharged during system start up, facing northwest.

Photograph #64 Date: December 1, 2009 Photographed by: Shawn Shiffer

Description: View of air stripper in treatment unit during system start up, facing east.

PHOTOGRAPH LOG

Photograph #65 Date: December 2, 2009 Photographed by: Shawn Shiffer

Description: View of contractor collecting influent sample during system start up, facing north.

Photograph #66 Date: December 3, 2009 Photographed by: Shawn Shiffer

Description: View of contractor collecting influent samples from individual extraction well sampling ports in well valve vault, facing down.

Photograph Log

Photograph #67 | Date: December 4, 2009 | Photographed by: Shawn Shiffer

Description: View of treatment unit in operation, facing south.